NATIONAL MUSEUM OF VICTORIA

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The Journal of the Department of Agriculture of Victoria, Australia.

May, 1925.

PRINCIPAL CONTENTS

Wheat and Its Cultivation

Wheat Pickling

Nhill Crop and Fallow Competition

Fertilizers and the Fertilizer Industry

The Better Bull

Registration of Stallions

The Khaki Campbell Duck

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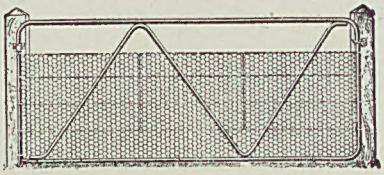

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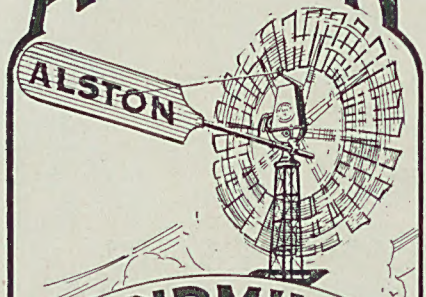

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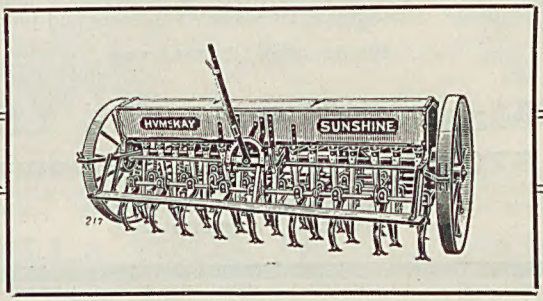

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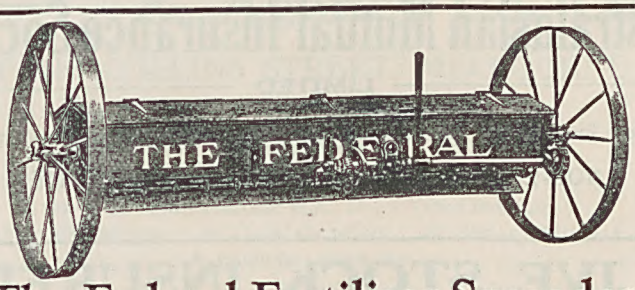

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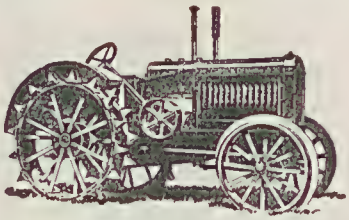

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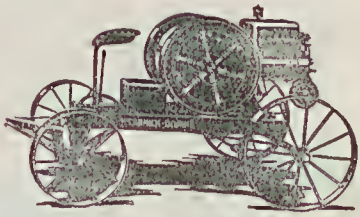

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WHEAT AND ITS CULTIVATION.

(Continued from page 204.)

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XIII.—FACTORS FOR SUCCESS IN WHEAT CULTIVATION—*continued.*

5. Efficient Implements and Plant.

Modern wheat-growing methods require labour-saving implements at every stage of raising the crop—for the preparation of the fallows, seeding of the crop, and the harvesting of the grain. Power is also required on every wheat farm for chaffcutting, pumping water, grading seed, &c.

The use of labour-saving implements is well understood by the Australian wheat-grower. Owing to the use of such implements as multiple furrow ploughs, large scarifiers and cultivators, 16 to 20-hoe seed-drills, and "combine" drills and powerful harvesters, the Australian farmer, notwithstanding the distance from the wheat markets of the world, is able to compete with the world in grain production. For the haulage of these implements he has hitherto used horses, though a small percentage of the larger wheat-growers use tractors for the preparation of the land and the harvesting of the crop. The tractor has not yet become popular with the Australian grain-grower. The main factors hitherto operating to prevent its widespread use among men with average holdings have been—

(*a*) High initial cost, (*b*) high price of fuel, (*c*) mechanical knowledge necessary for efficient working, (*d*) relative unreliability as compared with horses, and (*e*) necessity for providing heavy depreciation.

On the other hand, the heavy continuous work they are capable of giving at seed time, at harvest, and in haulage on the roads, makes them especially desirable for the man who farms on a large scale.

The minimum equipment of implements for the average wheat farm costs, at the present time, approximately £1,000. For tillage purposes a multiple-furrow plough (either disc or mouldboard), set of harrows, a cultivator, a scarifier, and a roller are necessary. For seeding, a grain-fertilizer drill or a "combine" drill is essential. For harvesting, a stripper and a winnower are used on light Mallee country, or a complete harvester or reaper-thresher on heavier land. A binder is essential for cutting hay for horse-feed, and at least one heavy wagon is required for hauling grain to the railway station. In addition to these essentials, a chaffcutter, grain grader, and grain pickler are to be found on most farms, and an engine is almost indispensable for chaff-cutting, pumping water, and providing a source of power for the farm. For haulage of implements, a good draught horse, or the equivalent in the form of a tractor, is required for every 25 to 30 acres of land cultivated.

The harvesting implements, binder, stripper, winnower, harvester, have become more or less standardized. There is, however, a wide range of types in tillage machinery. Ploughs show the greatest variety. The aim in ploughing is to get the greatest number of acre-inches of soil turned over at the minimum cost, and this can be most effectively done by using large multiple-furrow ploughs, requiring 8 to 10 horses. Just as soils vary considerably in depth, texture, and lightness, the implements used for cultivation vary.

On land that is likely to break up very fine, the mouldboard plough is generally used rather than the disc plough. It is also usually preferred where the land is heavily covered with weeds or rubbish. The mouldboard plough turns the land more effectively, but subsequent tillage operations are somewhat heavier with the mouldboard than with the disc implement. In heavy clay soils, where moisture conditions are suitable, the disc plough will do work at lower cost than the mouldboard.

In the Mallee areas, stump-jump modifications of the mouldboard and disc ploughs must be used to cope with the stumps left in the ground after the initial clearing operations with the Mallee roller are completed.

Cultivators are essential on every wheat farm. The cultivator fallows the plough, lightly turns over the land, brings clods to the surface, and kills weeds. The spring-tooth cultivators are the lightest forms of cultivators, and are very effective on loamy soils or on somewhat loose seed-beds. In some heavy and clayey soils, the disc cultivators are preferred by many for breaking up land and killing weeds effectively.

The scarifier is a rigid-tyne implement, usually much heavier than the spring-tooth cultivators, and does very effective work in killing weeds and in breaking up fallow on which a hard crusted surface has formed. For land free from stumps, rigid-tyne scarifiers are exceedingly effective in working the fallow. Stump-jump scarifiers must be used on Mallee land.

During recent years, "combine" drills, i.e., machines combining a spring-tooth cultivator with the grain-fertilizer drill, have become very popular. They present the great advantage of enabling one man and

one team to combine the final cultivation with that of drilling. This is a real advantage, for the seeding season is normally so restricted, and, apart from the saving in labour, the "combine" enables the seed to be sown under very favorable conditions on a moist newly-tilled seed-bed with the minimum risk of subsequent interference from weeds.

Success in wheat-growing is largely dependent upon the choice and adjustment of implements to the type of soil, and to the use of effective implements for seeding and harvesting.

6. Good Management and Business Ability.

Farming a Business.

The production of good crops and stock and the maintenance of soil fertility are the foundations of scientific agriculture. But more is required to make a successful farmer. Business methods are as important as production methods, for, if the crops and stock are produced at too great a cost or marketed unwisely, a farm may bring in but little profit.

Farming has become a business, and business methods must be applied to every phase of activity. This means that there must be a proper adjustment of capital, land, labour, and equipment. There should, for example, be no more land than the capital and equipment will handle to its full capacity. No more money should be invested in implements than can be used with profit on the land available.

A system of crop rotation should be adopted which will make for the maximum utilization of land, distribute the work of the farm throughout the year, and permit the full employment and business-like manipulation of the labour available. Team work must be adjusted so as to secure the maximum amount of service from the number of animals kept, and effort made to cheapen production at every possible point.

The farmer must try to discover the point at which increased labour and fertility applied fail to yield a more than corresponding increase in crop return, and then endeavour to reach it, but not pass it. He must know thoroughly the market in which he has to compete, something of the regions in which his competitors work, and also something about their method.

Agriculture is generally regarded as an art based on science. The more completely the principles underlying the art are understood, the more successfully can the art be prosecuted. Farming, however, is more than an art. It is a business, and organizing and executive ability are as essential as a knowledge of the principles underlying the cultivation of the soil and the feeding of live stock.

Qualifications for a Successful Farmer.

The successful farmer must have a knowledge of the principles of agriculture and possess energy, enthusiasm, and considerable business ability. Let us briefly consider these points:—

The farmer of a generation ago was primarily a labourer. Physical strength and manual dexterity were among his greatest assets. But the farmer of the future will require far more knowledge and ability than his predecessor. He has to farm land of much higher price than

his predecessors—land which may have been depleted in fertility by generations of improvident husbandry. He has to face new pests—fungoid and insect—unknown to his predecessors, and has to fight an army of introduced weeds. Mechanical ability has always been desirable for a farmer, but during the past generation the great increase in the number of complicated machines has made this ability of more importance than formerly. "Combine" drills, binders, petrol engines, harvesters, tractors, and other expensive machinery call for mechanical ability if they are to be handled efficiently. Inexperience or carelessness with these machines, especially tractors, may cause more than the loss of a month's wages. He should possess a knowledge of the practice in the district in which he settles. He should have, for example, a knowledge of the prevailing types of agriculture, the time and method of preparing the seed-bed, amount of seed, time of sowing, best varieties, and the amount of cultivation necessary for the crops he has to sow. He should be familiar with the common weeds, plant diseases, and insect pests, and the methods of controlling them. He must also be familiar with the selection, adjustment of farm machines, method of construction of farm buildings, and be familiar with the marketing of farm products. He needs to know, with respect to the locality in which he settles, the probable and possible yields, the gross and net values at the farm, and the degree of diversification normally practised.

In any community where agriculture has been well established for some time, the prevailing tendency of the majority of farmers is towards correct methods of cultivation. By carefully studying these methods it may be possible to make improvements, but, on the whole, the local practices will usually be sound and rational.

No intending farmer can fail to benefit by visiting a number of the best farmers in the community in which he decides to settle, and making a close investigation of their methods. This is especially true of those districts, e.g., the Wimmera, where the farmers have been established for a sufficient length of time to test out their methods. There is probably no occupation in which knowledge and experience are as necessary for *complete* success as in farming. It requires years of experience for a man to become a successful banker, engineer, or business man. But all too frequently the public is led to believe that men with little or no previous experience, and possessing but a slight amount of capital, can be successful at farming. Successful farming demands experience in weather and seasonal variations, disease, plant and annual nutrition, soil management, complicated machinery, and business affairs.

No man would expect to embark successfully in the manufacturing industries without a knowledge of the industry, a keen desire to engage in the business, adequate capital, nor without bringing energy and enthusiasm to bear on every branch of the work Nor can he expect to achieve success in modern farming without bringing, at least, the same amount of knowledge, energy and capital to his aid.

The man who lacks energy will find farming intolerable, and without enthusiasm and faith in the industry he cannot hope to weather the occasional periods of depression and low prices, crop failures, ravages of insect pests, or the many troubles the successful farmer is constantly

combating. The highest success is achieved by those who possess good common sense and business ability, and who combine this ability with experience, scientific knowledge of plant and annual production, mechanical skill, and hard work.

The progressive farmer will stand ready to accept new ideas from any source, and, if they appeal to him, to test them out in practice. The ideas of agricultural scientists, agricultural journalists, business men, mechanics, and neighbouring farmers should receive due consideration, and, if worth while, put to the test.

More farmers fail because of faulty management than because of faulty production. The principles underlying the raising of crops and stock do not alter, but the proper organization of a farm may change with every new invention.

More farmers fail because the size of the farm or the methods of farming do not keep men, horses, and machinery fully employed than fail because of poor crops.

The kind of business ability needed is that required for the organization of a farm into a successful business enterprise. The idle horse in the barn is a more frequent source of loss than is a bad bargain in buying a horse.

If the farm is large and requires much capital, the farmer should be capable of building up a good organization and correlating the various branches of production.

If the farm is small, the owner may have to do a considerable portion of the work, and will need to know how and when the work of each section of the farm should be done. He must plan his work ahead of time. It is not enough that he should merely have a plan for field work. He should know precisely what to do in various emergencies, and must foresee most things liable to go wrong, and prevent them from going wrong.

7. Selection of a Farm an Important Factor for Success.

The success of the wheat-farmer is often dependent on his choice of a farm. The selection of a farm requires more care than choosing any other property, because there are so many factors which go to make up its value. An experienced farmer will make the most thorough investigation of these factors before he makes his purchase.

One usually buys a farm for two reasons: the desire to engage in farming, or the conviction that a farm may be a good investment. Whether an individual will make a farm pay will depend on whether he is a good farmer and has good business instincts. If he has these qualities and purchases a farm wisely and at a reasonable price, his success is fairly assured.

There are persons who have made a success of farming without previous experience, but there are many more who have failed.

In seeking for a farm, one should look at the matter primarily from a business point of view. He should know clearly the factors which make a good farm, and should study the farm under offer in relation to each of these factors.

There are areas where farmers have always prospered. In some seasons, of course, they have done better than others, but in most cases they have rarely failed to live fairly comfortably.

The chances are greater if one settles in a good agricultural region where success is the common lot than if one goes to a locality where success is rare. In the Wimmera and on the volcanic areas of the Western District, the Snowy River flats, the Hunter River district of New South Wales, the Darling Downs of Queensland, the reclaimed swamps along the Murray in South Australia, the coastal plains near Adelaide, are localities where farmers have done well and will continue to do well. The land is very fertile, and even in unfavorable seasons the yields are fairly satisfactory, whilst in good years the profits are considerable. On the other hand, there are regions where a man will struggle for a lifetime against heavy odds. Men are always pushing up into hills and into barren lands and fighting with forest and drought. Sometimes their efforts are successful, but in many cases they struggle along for years on a mere pittance. Attempts are frequently made to cultivate land that is only suitable for pasture or for forest. Ultimately the farmer is compelled to abandon his task, and to let the land produce what it is fitted for by nature.

There is much land in Victoria that cannot be made to pay reasonable wages to the operator at the present prices of farm products. No one advocates working a mine that does not pay. Why work land that does not pay good wages to the farmer? It may be demonstrated that such land may be made to yield big crops. But such a demonstration means nothing if the cost of production is more than the value of the crops grown. The demonstration may be interesting in showing us how easy it will be to increase crops when the prices received warrant the increase. Merely because some one cleared land and built a house on it is not sufficient reason for farming it. Land that will not pay to till should be used for grazing or forest. Crops that require much labour should be given as good a soil as conditions will allow. Some of the more important factors in selecting a wheat farm are the following:—

(*a*) *Natural Fertility.*—The natural fertility of the land is usually the most important single point to consider in buying a farm. Man very rarely makes a really rich soil out of one that was naturally poor. Nature had untold ages to build up the soil by green manuring and the decay of countless generations of grass and herbage.

We may add organic matter and fertilizers and grow good crops, but if the soil is not naturally rich it will fail to grow profitable crops as soon as we stop feeding it. If the crops are valuable enough, it may pay to farm poor land in this way. For example, the sandy soils east of Melbourne are exceedingly poor; but they are easily tilled, and it pays a farmer to add enormous quantities of stable manure and artificial fertilizers to such soils rather than to use heavy clay soils that are rich, but that require more work and do not grow such good quality vegetables. These market garden soils have been enriched during the past generation by transporting the fertility of the Melbourne stables to them. It is not uncommon to use 20 tons of stable manure and half a ton of commercial fertilizers per acre in raising these intensive crops.

(*b*) *Climate.*—Wheat thrives best in Australia where the annual rainfall ranges from 17 to 22 inches, and where 65 to 85 per cent. of

the annual fall occurs from April to October. The optimum winter rainfall for wheat is about 12½ to 15 inches, though heavy crops may be raised by bare fallowing where the winter rainfall is only 10 inches per annum.

(*c*) *Proportion of Waste Land.*—The farm should be thoroughly examined to determine the proportion of arable land, pasture land, and waste land. Waste land is a dead weight on the farm, and unless it can be made to bring in a small revenue it will remain a burden on the rest of the farm, as the producing portion of the farm must bear interest, fencing, and maintenance charges on the unutilized area.

(*d*) *Water Supply.*—Water supply is one of the most important factors to consider in choosing a farm in the wheat belt, especially in the drier Mallee areas. An abundance of good water is essential for stock and domestic purposes. The nature of the water supply varies with the district. On the whole, the wheat belt of Victoria is well served in this respect. In the Mallee areas there are three ways in which stock and domestic water is assured.

In the artesian area, from Underbool to the South Australian border, bores are put down to a depth of 150 to 250 feet, and permanent water of good quality may be obtained in any volume throughout the year. The farm water supply system in this case consists of a bore, tank, and mill, with a reticulation service to the paddocks. In the eastern Mallee, farmers are dependent on tanks and dams, which are filled with water catchments in the neighbourhood. Other farms again are connected with the distribution supply of the State Rivers and Water Supply Commission, and dams are filled at regular intervals throughout the year. In the Wimmera and North districts, most of the farms are connected with the distributing channels of the State Rivers and Water Supply Commission. In Gippsland, the North-east, and parts of the Western District, there are permanent streams which furnish unfailing water supplies for the farms with a frontage to the stream. In other cases, dams or wells constitute the water supply.

The water supply should be carefully examined to see if it is adequate for the purpose in view, and how much additional expenditure must be incurred to make it sufficient for the purpose required.

(*e*) *Fencing.*—The condition of the fencing should receive careful consideration. The cost of fencing is always a serious burden on a farm. The existing fences may be in bad repair, or badly placed for economical working on the farm, and require regrouping. Their condition and the probable cost of reconstruction must enter into the buyer's consideration.

(*f*) *Distance from Railway.*—The distance from a railway is an important item in valuing a farm. It is true that the Lands Department classifies land for sale according to its quality, but, other things being equal, the farm near the railway station is more valuable than the farm remote from the station, and always finds a readier sale. This is particularly true of the wheat farm, because of the saving in heavy haulage of wheat, manures, bags, and supplies in the case of the farm in close proximity to the railway.

(*g*) *Unearned Increment.*—The possibilities of an increase in land values must be taken into consideration. In many regions a large part of the profit in farming comes from an increase in land values. This

is one reason why farms in the new Mallee areas are usually so keenly sought after. The probable future value of the farm as well as its present earning power should, therefore, be taken into consideration. In some areas, e.g., Wimmera, land values are at present very high. With further improvements in cultural methods, or an increase in the price-level of wheat, wool, and lambs, they might even go much higher. But in the newer Mallee areas, where pioneering methods are still in vogue, there is more opportunity to profit by the unearned increment than in those areas where the farming methods are already at a high level, and where practices have become more or less standardized.

(*h*) *Financial.*—The final test of the suitability of a given wheat farm for settlement or purchase must depend on financial considerations. One must ensure that the amount of money available, either immediately or in the future, will be sufficient to pay for the property under the terms of the contract of sale, and meet personal needs and operating expenses.

The probable cost of establishing the farm, and the probable profit to be derived when it is in full working order, should be determined. To do this, the following inquiry should be made:—

1. The Cost of Establishing the Farm.

Determine the complete equipment costs of the farm, including buildings, fencing, live stock, implements, machinery, harness, tools.

Determine the probable operating expenses, including interest on borrowed money, less any income, until the farm is in full working order, or until the first harvest is obtained.

From these estimates the total investment to establish the business may be obtained.

2. Testing the Business when Established.

Determine the probable gross receipts to be obtained when the farm is in full production. These estimated receipts should be based on intelligent estimates of the amount of production possible, based upon an average of years and on average prices for the district.

Determine all operating expenses to be met, including labour, feed, seed, fertilizer, water rates, power, insurance, repairs, rates and taxes, cost of contract work, cost of marketing, and living expenses of the operator.

As an investment comparable with commercial businesses, the farm should return a sum sufficient to pay the operating expenses, interest at the prevailing rate for moneys invested, a fair rate for depreciation on implements, and a reasonable sum for supervision.

If the obligations are greater than the receipts, the explanation may be too high a price for land, too expensive an equipment, too small an acreage under crop to meet the expenditure charges, too low a yield for the expenses, or some error in information, judgment, or management.

Progressive Conservatism.

There is much to learn about farming in any community, and one man cannot hope to learn it all. The experience of the community is of the utmost value to every farmer, though few realize how much they

owe to their neighbours. Different men try out new varieties of crops, new machines, different breeds of animals, new methods of raising crops or saving labour. The observant man gets the benefit of the experience of all.

The successful farmer must be ever on the alert to see whether he is following the best type of farming. But there are so many factors involved that it is very difficult to balance all these factors, and farmers are slow to change to untried things.

Generally speaking, one should follow the type of farming practised in the district until one is certain that something else will pay better. Even then he should go slowly, as he is likely to find that some factor has been overlooked. A progressive conservatism is most likely to bring success.

Few other industries are so subject to violent changes in production and prices as agriculture. When a miller buys a certain amount of wheat, he knows precisely how much flour he will have to sell and what will be the cost of manufacture. But when a farmer plants a certain area of wheat or hay, he does not know what the harvest will be. The yields of the staple crops fluctuate considerably, and this variation is due mainly to the season, and must be expected.

For products that are easily stored, such as grain and wool, the years of highest yields are generally the years of highest value per acre; but for perishable products the years of high production are often the years of lowest value per acre. The more perishable the crop, the more subject it is to violent fluctuation in value. Perishable products are constantly in danger of over-production. After a year of good prices, the acreage usually increases. This is generally the case with potatoes, onions, &c. A good season and heavy yield leads to a rapid slump in prices. The low prices please the consumer, but discourage the farmer, and the net result is a sudden decrease in production, which pleases no one.

Farmers are too prone to think that present conditions will continue. If good prices rule for three or four years, we are inclined to think they will remain so indefinitely. In the case of prices, it is the very feeling of certainty that present conditions are to continue that makes it impossible for them to do so. Generally speaking, the longer the time required to grow a product, the worse the periods of over- and under-production become. A shortage in an annual crop may be made up in a year, but it takes 10 to 20 years to adjust the area under citrus or orchards.

The ability to form a rational forecast of the future is one of the most valuable business assets.

Does it Pay to Produce Large Crops?

Improved crop yields may be secured by the use of more labour, more fertilizers, and more expense in general. Just how far it is wise to go is the problem. Most farmers are not growing as large crops as their conditions warrant. Some are growing larger crops than it pays to grow.

The usual theory is that every farmer ought to secure two or three times the yields per acre that he now obtains, regardless of cost or profit.

This idea is not new. It is expressed by the farmer while viewing the enormous crops on experimental farms; he says that he could raise such a crop if the State would pay the bills. The same idea is expressed by the economist when he speaks of the law of diminishing returns.

Just how much it is wise to spend on a crop is largely dependent on the rainfall. If the rainfall limits the crop, no amount of fertilizer can save it. It may be demonstrated that certain methods of cultivation will conserve moisture. In the drier districts, the rewards for extra working of the soil are sure, because the drought is sure. But in regions of heavier rainfall, such methods may pay one year in three and fail in all other years, because there is water enough without them. On the occasional year, when the extra work of moisture conservation pays, it must pay for the intervening years when it was not needed.

The use of fertilizers has increased enormously. As crops rise in price, their use is certain to increase. Many farmers would make more money if they used more fertilizer, especially if their cultural methods were more thorough.

The increased returns for varying quantities of fertilizer on wheat and other crops have been worked out by the Department of Agriculture. These afford a basis for calculating profits to be obtained from varying quantities of fertilizer. But it must not be assumed that the difference between the value of the increased crop and the cost of the fertilizer is the net profit per acre through using the manure. The extra cost of applying the fertilizer and the costs of handling the extra crop induced by the fertilizer has to be taken into consideration. Farms that secure large yields per acre often fail to make a good profit. Efficient management will bring fairly good profits with ordinary production, but the highest profits come from a combination of efficiency and good production.

SUMMARY.

Given suitable climatic conditions and a reasonably fertile soil, the main factors for successful wheat cultivation in the Australian wheat belt are—

1. Conservation of soil moisture by early fallowing and thorough working of the soil.
2. Liberal manuring of the crop.
3. Regular crop rotation and association of sheep with wheat growing.
4. Rational treatment of seed.
5. Efficient implements and equipment.
6. Good management and business ability.

In every one of the more important wheat districts of Australia we may find notable examples of successful wheat-growers who stand out from their fellow farmers in applying these principles. The numerous farm competitions organized throughout the States have brought many such illustrations before the rural communities. When extension or publicity work in rural districts is so organized as to bring home forcefully to every rural community the precise reasons for success in these outstanding cases, one important problem in agricultural education will have been solved.

(*Concluded.*)

CROP AND FALLOW COMPETITION, NHILL, 1924.

Report of the Judge, H. A. Mullett, B.Ag.Sc., Senior Inspector of Agriculture.

The Nhill Agricultural and Pastoral Society has brought its twenty-fourth annual crop and fallow competition to a successful conclusion. Gauged by the number of entries (70), by the keenness of the competitive spirit shown, and by its educational value, this competition still leads the way in the big progressive movement which the society pioneered, and which has since spread throughout the length and breadth of the wheat belt of Australia. Nor is the society resting content with its efforts, for it is still breaking new ground in inaugurating the J. B. Turner Cup, competitors for which are required to undertake certain field experiments for the benefit of the district at large. Mr. J. B. Turner has presented 25 guineas for a trophy for this competition, in which competitors are themselves required to conduct approved field experiments in fallowing methods for wheat.

For three years crops grown on 10 acres of summer fallow will be compared with those grown on 10 acres of winter fallow alongside. The rules provide for the sowing of carefully prepared areas of both types of fallow under controlled conditions, and for the weighing of the produce. By this means the society hopes to collect a mass of data in relation to the two methods of fallowing, a matter of great practical importance.

THE COMPETITION 1924.

A total of 19.9 inches of rain fell at Nhill during the year, but its distribution was very irregular; thus at the Salisbury end not more than 16 inches were recorded—an amount which more closely approximates to the normal precipitation. After a splendid downpour of over 3 inches on the fallows in February, the season set in dry enough through the autumn and winter to lead many to suppose that a drought was imminent, but the situation was completely changed by bounteous rains which fell in the early spring, and continued intermittently until the crop was fully matured. There is no doubt that, had the fallowing methods been any less thorough than they were, at least some of the crops would have suffered the same fate as did not a few of those grown on imperfectly prepared land in some of the new Mallee districts. Here the wheat was too far gone to recover by the time the rain came. At Nhill, however, the crops continued to hold their own during the dry spell, though the grass in the grazing paddocks received a severe set-back.

Many bumper crops were harvested throughout the district. It is difficult to obtain reliable information as to the yields on broad acres, but one instance, where accurate measurements were made, and the weights carefully recorded, is the 6-acre experimental field conducted by Mr. W. Dahlenburg, at Salisbury, for the Department of Agriculture. This paddock averaged 50 bushels per acre for the whole of the official plots, while two of them, each one-third of an acre, returned 57 bushels and 56.8 bushels per acre, respectively. This is conclusive evidence of what can be done by a skilful farmer in the Wimmera on a 16-inch rainfall.

The paucity of the winter rains was not without its compensating advantages on the red land, where germination troubles, due to water-logging, &c., are often experienced. Consequently, some unusually good crops for this class of soil were noticed in the district—yields of over 40 bushels per acre being reached in some instances. Many of the red paddocks are, of course, too refractory for yields as good as this, and can be improved only by the use of some soil amendment such as gypsum.

Attention to the red land is the next step that should be taken in the improvement of Wimmera wheat yields. There is hardly a paddock that does not contain a few patches of red clay, and in some districts the area is considerable. Where the two classes of soil occur in patches in the same paddock, it is difficult to secure maximum yields from either, because entirely different methods in respect to the preparation of the fallow and the time of sowing require to be used for each. The red soil is generally of a dense, tenaceous, clayey nature, which may be turned up by the plough in big clods, which set like bricks if allowed to bake in the sun. If worked down at all fine the surface runs together on wetting, and on drying again sets like cement. Needless to say, such a soil is a very tricky and uncertain one on which to grow wheat. Where there are extensive areas of it, experienced farmers find it best to plough the red land early, to break the clods before they dry out, but to leave the fallow reasonably lumpy, and, above all, to sow the wheat early. But these methods involve poor moisture conservation by reason of the imperfect mulching of the fallow, and tall dirty crops because of the early sowing. When patches occur in the black paddocks they are of necessity allowed to take their chance, as it is impossible to give them individual attention; consequently they generally lower the average yield, and become centres for the multiplication and spread of weeds like barley grass and wild oats.

Following on the successful use of gypsum as an amendment for refractory soils in the Goroke district, some preliminary experiments have been conducted at Salisbury with very promising, though not, of course, as yet conclusive results. Those who attended the field day at Salisbury were able to see for themselves the manner in which a wheat crop on mixed red and black land can be rendered much more uniform by treatment with gypsum. They also saw that gypsum prevents the fallowed red land running together after heavy rain, and yet again that the effect of an application lasts for more than one year. Plentiful supplies of the material exist close at hand at Antwerp, and there is no doubt whatever that the texture of the red clays can be immensely improved by the addition of gypsum at the rate of not less than a ton per acre. The cost of this material should not exceed 15s. a ton in bulk landed at Nhill farms. In many cases it would only be necessary to put the gypsum on the red patches; hence, though applied at the rate of, say, 1 ton per acre, the dressing would average only 5 cwt. per acre where one-fourth of a paddock consisted of refractory red soil.

There are already machines on the market which distribute gypsum satisfactorily, and which permit of it being put on in varying quantities according to the needs of the soil, and, if necessary, even stopped altogether without pulling up the horses. Thus in a mixed paddock the gypsum can be cut out on black patches which do not require treat-

ment. Wimmera wheat-growers generally, and those of Nhill in particular, then, will look forward with a great deal of interest to the results of the experimental work with soil amendments.

"Take-all."

In almost all the paddocks entered for competition, "take-all" in the form of "dead-heads" had taken some toll of the crop. As a rule, the affected plants were scattered right throughout the field instead of occurring in patches, as is usual. A notable feature of the outbreak was that wheat sown on fallowed land which had been resting in grass was subject to the most severe attacks. Instances of severe "take-all" in wheat where the fallow followed grass have been noted from time to time in the Mallee and Wimmera for years past, but never before have

A Solid Wall of Crop.

(At Messrs. H. R., J. & T. W. Rintoule's.)

so many striking instances of the phenomenon presented thmselves in the same district. It serves again to illustrate the fact that resting a paddock in grass is not necessarily a cure, and indeed may assist in the multiplication of the disease. It should also drive home the point so often made that where barley grass, spear grass, wallaby grass, and other possible hosts of the "take-all" disease are permitted to grow on the fallows, they are liable to act as sources of infection, from which the fungus may spread to the wheat. In an ordinary season this results in the infestation being confined to patches round about the place where the grass grew, but the spores are always liable to be carried by implements all over the paddock, as evidently was the case this year.

The growing of oats is the most practicable method of suppressing "take-all," because the disease does not attack oats, and hence can be

starved out; but a thin straggly crop scratched in on wheat stubbles is no cure, because it does not suppress barley grass and other weeds, which are hosts of the disease, and help it to carry on till the next wheat crop is sown.

Where a paddock is badly infected the best remedy is to make as good a burn of the stubble as is possible in the circumstances; fallow it well, and sow oats late. Fortunately, most of those crops attacked in the Wimmera have an extra good bulk of straw this year, so that a good burn is certain.

There is no doubt that "take-all" is on the increase in the Victorian wheat belt, and that it constitutes a menace equal to that of ball smut before the present methods of pickling were perfected. To a large extent the present system of farming under which the rotation —fallow, wheat, fallow, wheat, &c.—is practised is responsible for the increased loss caused during recent years. The trouble is that many farmers do not grow any oats in the rotation until after a severe attack of "take-all" makes its presence felt. They then rush to oats, and expect an immediate cure without realizing that the land is now very foul with "take-all" spores. Oats should be used as a preventative rather than a remedy. Though oats are rather less profitable than wheat to grow, over a series of years the net return of the farm is better if oats are grown now and then in the rotation.

The rotation—fallow, wheat, fallow, wheat—has been shown to be one that is most susceptible to attacks of disease, and while the introduction of oats tends to minimize this risk, the rotation is unsatisfactory in another respect, viz., that it places a great drain on the humus content of the soil. Most Wimmera land is rich in humus, but sooner or later the effect of the steady drain will result in decreased water-holding capacity and lower nitrogen content. Where the oats are grown as a forage, of course, large quantities of humus are added to the soil by the grazing animals, and the practice of growing oats as a forage crop should be more extensively followed.

Recent improvements in the reaper-thresher and header have now made it possible to harvest peas for grain. By using a false comb and making certain adjustments to the threshing part of the machine, the crop can be picked up and a satisfactory sample made. There are, of course, the usual difficulties incidental to the picking up of a "down crop," because when ripe the peas lie close to the ground, but there is no question that the wheat-grower who wants to grow peas for grain, and, incidentally, add humus to his soil, and also starve out "take-all," can do so with very little more labour than is required to harvest wheat. Whether the crop will be used extensively depends, of course, on the yields that can be obtained. It is not to be expected that heavy crops can be grown on stubble land, but on fallow, peas should at least pay as well as oats.

"Strangers in Wheat."

Wheat-growers are often puzzled by the comparative rapidity with which "strangers" multiply in wheat. Where several varieties are grown on the same farm, it is not hard to understand that admixture takes place through failure to clean out the harvester or the drill when

changing to a different variety. Once mixed, the proportion of each variety, provided there is no crossing, should remain constant if the varieties are equally prolific. Most of the strangers are likely to be less prolific, so that their presence is undesirable, and if there is no further admixture they should slowly diminish in numbers. But it is a matter of common observation that they generally increase, so that there must be other factors at work.

Another circumstance which undoubtedly is responsible for much mixing is the "throwing back" or "sporting" of varieties. Some farmers grow nothing else than Federation, yet in the course of time it becomes admixed with unknown wheats. Wannon is a wheat which was originated as a result of "sporting." It appeared as a stranger in a crop of Federation at Longerenong College, and was noticed by Mr. Tulloh. Such a wheat, when grown where its behaviour can be observed, does not split up, which is a clear indication that it is not a crossbred. A proportion of the mixing, then, may be due to this cause,

Portion of Mr. C. F. H. Reichelt's Wheat Crop at Woorak.

and it cannot be remedied. In new wheats, of course, some of the unfixed generation may be present, and this naturally gives rise to strangers.

It is usually accepted that wheat does not naturally cross-fertilize in the field unless subject to some accidental interference. Nhill crops, as a rule, are comparatively free from admixture, but last year an unusual number of strangers were noticed, and they are traceable to cross-fertilization brought about by the severe frosting that occurred in the district two years ago. The frost came just when the wheat was in process of flowering, resulting in the destruction of the sexual organs, and consequently undeveloped grain. It is conceivable that, in a number of instances, the male part of the flower would be the only part damaged, because it emerges slightly before the female part. Hence the wheat would be castrated as effectively as if done by a plant-breeder's forceps. The live unfertilized stigma would thus be receptive

to pollen from neighbouring plants, and if these were of another variety a cross would result.

As this supposed happening was two years ago, the wheat last year would be in the first generation, and consequently no general admixture would be noticed; now, however, it would be in the second or segregating generation, and hence the mixing would be very obvious. In at least one paddock at Nhill there was very conclusive evidence that considerable crossing had taken place between Wannon and No. 7063. All the variations likely to occur in the second generation from this cross were found. An instance of wholesale crossing due to frosting was recorded in New Zealand a year or two ago.

Of these three ways in which wheat is subject to mixing, there is only one the grower can minimize—admixture of varieties that takes place through his own carelessness. By sowing fewer varieties, cleaning his machines more carefully, feeding only hay which contains immature wheat, &c., he can to a large extent prevent the seed intermingling. Over the other factors he has no control. His remedy is to systematically purchase fresh seed from the State institutions where it is bred.

AWARDS.

Section 1.—Best Half of Farmer's Wheat Crop (Exhibit not less than 75 acres).

Mr. W. E. Dahlenburg was placed first, and awarded 96 points for a fine crop comprising Federation, Gallipoli 58, and Huff's Imperial. Mr. R. Blackwood was second with Federation and Wannon; he secured 91 points. Mr. C. P. Dahlenburg (Wannon) was third with 86 points.

Each of the placed competitors showed splendid crops of wheat, but Mr. W. E. Dahlenburg's entry was considered the heaviest, and it scored exceptionally well for purity, absence of weeds, absence of disease, and general evenness.

The winning crop was grown in three paddocks, and one of them—65 acres of Federation—was one of the densest and heaviest crops seen in the Wimmera for some years. It was grown on well worked summer fallow, liberally seeded, and heavily manured; 70 lb. of seed was used per acre, with from 112 to 120 lb. of 22 per cent. superphosphate. An interesting feature was the successful use of the dry copper carbonate method of pickling. The paddock was ploughed in March, spring-toothed in July, and again in August; in early October harrowed, then spring-toothed during the middle of that month. In November, December, and February, further harrowing was given after rain, and the paddock was worked up in March with a spring-toothed cultivator, and finally sown with a combined drill during the first two weeks of June. Two strokes of the harrows were given after the drill. Thus, in all, twelve operations were involved in growing the crop.

A 50-acre paddock of Federation and Gallipoli 58 was exceptionally pure. This crop was also grown on well worked summer fallow, and drilled during the second week in June with 72 lb. of seed and 112 to 120 lb. of super. (22 per cent.). The whole of this wheat should make splendid seed.

Mr. Robert Blackwood's crop was also very dense and heavy, though rather rank in growth; 175 acres were shown for the best half, and it was wonderfully uniform for such a large area. The varieties submitted were Federation and Wannon, and both were grown on summer fallow. The Federation was pickled with dry copper carbonate. The fallow on which the crop was raised was treated as follows:—Scarified in March and harrowed; in mid-July scarified again to kill weeds. During first week in September, first week in October, and again in mid-October, spring-toothed, and in November harrowed. After rain in February, a spring-toothing was given, and an additional stroke in March. The crop was sown early in June with 72 lb. of seed and 1 cwt. of 22 per cent. superphosphate.

Mr. C. P. Dahlenburg's crop was Wannon. It was sown at the end of May with a combined drill, 90 lb. of wheat per acre was used, with 112 lb. of 22 per cent. superphosphate.

All the other crops were heavy, and there was something of interest to be learned as a result of inspection of each. At Mr. O. J. Pohlner's a most striking instance of the value of summer fallow was observed. The bulk of the field was winter fallowed, but a portion had been summer fallowed in February. On this latter part, though treated exactly alike in all other respects, the crop was found to be very much cleaner and heavier. There was a distinct line of demarcation between the two portions of the crop.

On Mr. Peter Bone's farm an excellent illustration of the detrimental effect on the crop of discing paddy melons on the fallow in summer was noticed. Where a strip had been worked with a "knife bar" attached to a scarifier, the crop was bags to the acre better.

Section 1.—Best Half of Farmer's Wheat Crop—Exhibit to be at least 75 Acres.

Competitor.	Variety.	Yield.	Purity.	Absence of Weeds.	Absence of Disease.	Evenness.	Total.
Possible Points ..	..	**35**	**20**	**15**	**15**	**15**	**100**
W. E. Dahlenburg ..	Federation, Gallipoli, 58, Huff's Imperial	35	19	14	14	14	96
R. Blackwood ..	Federation, Wannon	34	18	12	13	14	91
C. P. Dahlenburg ..	Wannon	29	17	12	14	14	86
E. G. Hoffman ..	Wannon, Ind. F.x Federation	20	18	14	14	15	81
H. R., J. & T. W. Rintoule	Federation ..	27	15	13	13	13	81
A. Schultz ..	——	25	16	12	14	13	80
J. & T. W. Rintoule	Federation, Wannon	25	16	12	13	13	79
O. F. H. Reichelt ..	Federation, Wannon	25	16	13	11	14	79
O. J. Pohlner ..	Federation, Dollar	28	18	12	6	13	77
Peter Bone ..	Federation, Wannon	24	17	10	14	12	77

Section 2.—Best Wheat Crop on Mallee Land, at least 100 Acres.

Mr. T. G. Marshall was awarded 84 points and first place; Mr. H. E. Simmering was second with 75; and Mr. O. Simmering third with 72 points.

The Mallee crops did not approach in yield those grown on the black land; nevertheless the yield of the winning crop was unusually good for Mallee land. The crop was very regular throughout, and comparatively free from disease.

The paddock was ploughed in June and harrowed, spring-toothed in September and again in October. In December it was harrowed. In March the paddock was spring-toothed, and the crop was sown in June with a combined drill; 70 lb. of seed and 80 lb. of 22 per cent. superphosphate were used, the harrows following the drill.

Heavy Crop of Wheat at Mr. W. E. Dahlenburg's, Salisbury.

Section 2.—Best Wheat Crop on Mallee Land, at least 100 Acres.

Competitor.	Variety.	Yield.	Purity.	Absence of Weeds.	Absence of Disease.	Evenness.	Total.
Possible Points ..	.. .. ..	**35**	**20**	**15**	**15**	**15**	**100**
T. G. Marshall ..	Federation ..	28	17	10	14	15	84
H. E. Simmering ..	Federation ..	26	16	8	11	14	75
O. Simmering ..	Federation ..	25	16	9	9	13	72
V. Collins	Federation, Penny, Huff's Imperial	18	14	10	11	11	64
Beacom Bros. ..	Federation, Wannon, Huff's Imperial	18	17	10	7	11	63
J. B. Marshall ..	Yandilla King, Penny, Ind. E. x Telfords	20	12	6	10	11	59

Section 3.—For Fallowed Black Land, at least 100 acres in Area.

As a result of the keen competitive spirit engendered throughout the district, the fallows submitted were so good that it is almost impossible to draw distinctions between them in a season like the present, when all contained maximum supplies of moisture as a result of abundant rains.

Mr. R. Blackwood's 100-acre paddock was considered to be best, and was awarded 99 points; Mr. Alfred Schultz was second with 97; and Mr. R. Blackwood and F. Kluge third with 96. Any one of the remaining fallows would win a competition in almost any other district.

The winning fallow was summer fallowed in March to 4½ inches deep, a pronged mouldboard plough being used. Immediately afterwards the harrows were put over the paddock while it was still moist. In June, weeds were cut with a scarifier working to a depth of 3 inches. In spring four strokes with the spring-tooth were given, viz., end of August, end of September, and end of October, and a fifth was given towards the end of November. Though the paddock was in grass last year, and was more difficult to get into condition on that account, Mr. Blackwood had it in first-class order. Full points were scored for moisture, for mulch, for absence of weeds, and only one point was deducted on the score of cultivation.

Mr. Alfred Schultz's two paddocks were almost equally good, but two points were deducted because the mulch was somewhat irregular in depth. Both paddocks were summer fallowed.

Section 3.—For Fallowed Black Land, at least 100 Acres.

Competitor.	Moisture.	Mulch.	Absence of Weeds.	Cultivation.	Total.
Possible Points	**25**	**25**	**25**	**25**	**100**
R. Blackwood	25	25	25	24	99
Alfred Schultz	25	23	25	24	97
R. Blackwood & F. Kluge..	25	25	24	22	96
W. E. Dahlenburg ..	25	23	24	23	95
G. H. Voight & Sons ..	25	21	24	23	93
C. P. Dahlenburg ..	25	23	22	23	93
J. & T. W. Rintoule ..	25	22	23	23	93
C. F. H. Reichelt ..	25	21	23	23	92
E. G. Hoffman	25	22	22	22	91

Section 4.—For Fallowed Red Land, at least 100 Acres.

The exhibits of Mr. V. Collins and Mr. C. P. Dahlenburg were considered equally good, and are awarded 94 points each. Messrs. Beacom Brothers were third with 91. It is a pity that this section does not attract a larger entry, as there is much to learn in fallowing this class of soil, particularly that of a refractory nature.

Mr. V. Collins' fallow consisted of a free working sandy soil situated on a well-drained rise. The land was ploughed shallowly in July and August, and harrowed. Late in September, it was scarified, and then worked over with a cultivator at the end of October. In mid-November, part was again worked with the cultivator. Three

points were deducted for rather uneven work, but otherwise the fallow was very good.

Mr. C. P. Dahlenburg's entry was perhaps the most interesting exhibit, because of the stiff red soil. By judicious treatment it had been got into splendid condition. It was ploughed early in June, and in early July, and was harrowed at the end of each day's ploughing—an important consideration in preventing the formation of hard clods on this class of soil. A fortnight later another harrowing was given. This was followed by strokes with the spring-tooth in early August, mid-September, and mid-November.

Handy Device for Fastening One of a Pair of Gates.

Section 4.—For Fallowed Red Land, at least 100 Acres.

Competitor.	Moisture.	Mulch.	Cultivation.	Absence of Weeds.	Total.
Possible Points	**25**	**25**	**25**	**25**	**100**
V Collins	25	23	24	22	94
C. P. Dahlenburg ..	25	23	23	23	94
Beacom Bros.	25	22	23	21	91

Turner Cup (25 guineas).

Highest Aggregate for—10 Acres each Summer Fallow, 1924; Wheat on the Fallow, 1925; 10 Acres Summer and Winter Fallow, 1925; Wheat on the Fallow, 1926.

The objects of the competition have been already described. There were ten competitors, a most creditable entry considering what is required of them.

As in the "open" fallow competition, the fallows had been so perfectly prepared, and were so moist as a result of recent rains, that it was difficult to separate them. In view of the practical importance of

the results, it is hoped that every contestant will continue until the end of the competition, irrespective of whether he is likely to win a prize or not.

Mr. Alfred Schultz was first with 188 points, Mr. Peter Bone second with 187, and Mr. W. Dahlenburg third with 184. For the winning fallow, Mr. Schultz was able to choose a remarkably even piece of soil. The plots were well laid out, being pegged at both ends and in the centre. A drawback, however, was that through being placed close to a fence it would not be possible to work the plots crosswise without unduly tramping one plot where the horses turn, and hence introducing differential treatment.

The treatment given each paddock was as follows:—The summer fallow was ploughed during the last week in February to 4 inches deep. Early in July, it was harrowed, and on the 16th of the month scari-

Knife Bar fitted to Harrows for Cutting Young Paddymelons (at Mr. Peter Bone's, Kiata).

fied. On 4th November, a stroke of the spring-tooth cultivator was given, and later in the month two harrowings. The winter fallow was ploughed on 16th July to 4 inches deep, and harrowed. Next day, and again later, a further harrowing was given, and on 27th August the paddock was spring-toothed, then in mid-October scarified. On 3rd November, a stroke with the spring-tooth cultivator was given, and later in the month two harrowings.

The winter fallow was ploughed on 16th July to 4 inches deep, and harrowed. Next day, and again later, a further harrowing was given, and on 27th August the paddock was spring-toothed, then in mid-October scarified. On 3rd November, a stroke with the spring-tooth cultivator was given, and later in the month two harrowings.

Some competitors lost a mark or two because their land was rather uneven; in other cases the plots were not pegged out. Competitors

should aim at giving their fallows entered in this competition just what they consider the normal working for both kinds of fallow. There is a danger that both fallows will be cultivated so well that the crop will not be a true criterion of what happens under ordinary practical conditions. Competitors are reminded of the rule which provides for the summer fallowing being done in February or March only, and for the winter fallowing between 15th July and 15th August. They should note the dates carefully.

Turner Cup.

Highest Aggregate for 10 acres each Summer and Winter Fallow, 1924; Wheat on the Fallow, 1925; 10 acres Summer and Winter Fallow, 1925; Wheat on the Fallow, 1926.

Competitor.	Fallows, 1924.					Total.
	Choice of Soil	Layout of Plots.	Regular Tillage.	System of Cultivation.	Condition of Fallow.	
Maximum Points ..	**30**	**15**	**15**	**40**	**100**	**200**
Alf. Schultz ..	30	13	13	36	96	188
Peter Bone ..	29	13	13	36	96	187
W. Dahlenburg ..	27	12	14	36	95	184
F. W. Kluge & Blackwood	28	11	12	36	96	183
Mrs. Dahlenburg ..	29	12	12	36	93	182
C. F. Reichelt ..	25	12	14	34	95	180
Geo. Batson, jr. ..	25	12	12	38	90	177
C. P. Dahlenburg ..	25	12	12	34	92	175
J. & T. W. Rintoule..	26	11	12	36	88	173
A. B. Dufty ..	20	14	12	33	91	170

Preliminary to Turner Cup.

The Turner Cup competition was to have commenced the year before last, but the society decided to defer it till this year. Certain of the competitors who had already prepared their summer fallowed plots decided to continue it as an unofficial competition, with the following results:—

W. E. Dahlenburg, first, 294 points.

R. Blackwood, second, 288 points.

Mr. C. P. Dahlenburg did not complete the competition, in that the weighbridge tickets showing the weight of wheat grown on each plot were not forwarded. The results of the experiment were as follow:—

W. Dahlenburg.—10 acres winter fallowed, average yield, 45.4 bushels per acre; 10 acres summer fallowed, average yield, 45.2 bushels per acre.

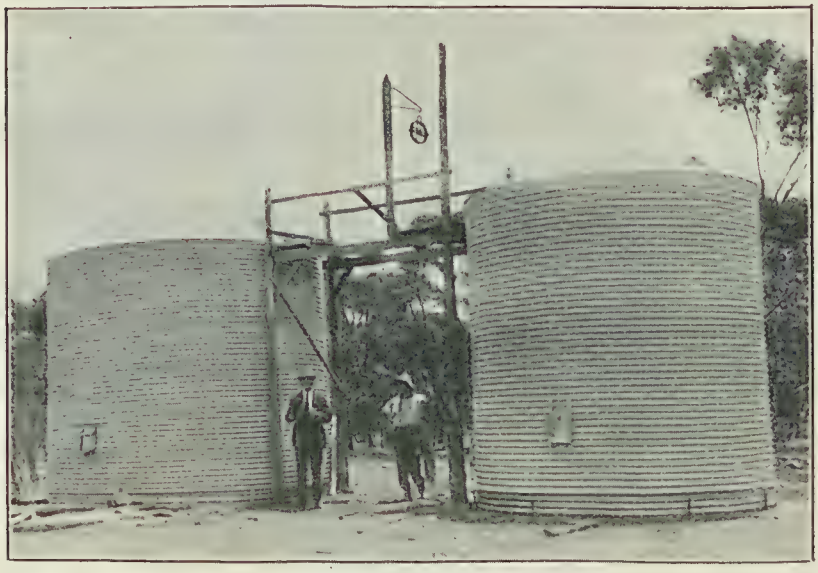
R. Blackwood.—10 acres winter fallow, average yield, 38.9 bushels per acre; 10 acres summer fallow, average yield, 40.7 bushels per acre.

Summarizing the results for the two farms, the 20 acres of summer fallowed land have yielded in all 5 bags and 1 bushel of wheat more than the winter fallowed 20 acres. Further results, of course, are necessary before the evidence can be accepted as conclusive.

Preliminary to Turner Cup.

Points for Crop, 1924.

Competitor.	Yield.	Absence of Weeds.	Absence of Disease.	Even-ness.	Drill-ing.	General Condi-tion.	Total.	Points for Weigh-ing.	Points for Fallow 1923.	Grand Total.
Possible Points ..	**50**	**30**	**30**	**30**	**20**	**40**	**200**	**100**	**100**	**500**
W. E. Dahlenburg	49	29	30	29	19	38	194	100	194	294
R. Blackwood ..	47	26	28	28	19	36	184	100	188	288
C. P. Dahlenburg	42	28	29	27	18	35	179	..	187	187



Handy Oat Silos.

Awards—Section 5.

In this section the fallow was judged during 1924, and in 1925 the wheat will be grown on the same fallow also. So far Mr. V. Collins and Mr. C. P. Dahlenburg are first with 94 points each. The fallows are the same as those described for a previous section

Section 5.

Highest Aggregate for Red Fallow, 1924; Wheat on the Fallow, 1925.

Competitor.	Moisture.	Mulch.	Weeds.	Cultivation.	Total.
Possible Points	**25**	**25**	**25**	**25**	**100**
V. Collins	25	23	24	22	94
C. P. Dahlenburg ..	25	23	23	23	94
Beacom Bros.	25	22	23	23	91

Awards—Section 6.

This competition, initiated by Mr. Alfred Schultz, sets the farmer a very severe task. It continues over three seasons. The whole of the wheat and the fallow on the farm during those three years is judged.

Mr. R. Blackwood, whose average sowing of wheat is about 350 acres, gained first prize with 364 points, Mr. W. Dahlenburg was second with 363, and Mr. A. Schultz third with 334. Details of selected portions of the winning crop have already been quoted.

SECTION 6.

Highest Aggregate for Whole of Fallow, 1922; Whole of Crop, 1923; Whole of Fallow, 1923; Whole of Crop, 1924.

Competitor.	Wheat, 1924.						Total 1922.	Wheat, 1923.	Fallow 1923.	Grand Total.
	Yield.	Purity.	Absence of Weeds.	Absence of Disease.	Even-ness.	Total.				
Possible Points ..	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**100**	**100**	**400**
R. Blackwood ..	35	18	12	12	11	88	96	88	92	364
W. Dahlenburg	35	18	12	14	13	92	93	85	93	363
A. Schultz ..	25	16	10	11	10	72	91	84	87	334
H. E. Dahlenburg	23	17	10	11	10	71	93	88	80	332

Section 7.

This section, which lasts for two years, is concluded this year.

Points awarded for crop and fallow are added together.

Mr. W. E. Dahlenburg was first with 192 points, Mr. R. Blackwood second with 190, and Mr. C. P. Dahlenburg third with 183.

Winners' methods have already been described.

SECTION 7 (SECTION 10 LAST YEAR).

Highest Aggregate for Fallow, 1923 (not less than 100 acres); Wheat, on the Fallow, 1924.

Competitor.	Wheat, 1924.						Fallow, 1923.	Grand Total.
	Yield.	Purity.	Absence of Weeds.	Absence of Disease.	Evenness.	Total.		
Possible Points ..	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
W. E. Dahlenburg	35	19	14	14	14	96	96	192
R. Blackwood ..	34	18	11	14	15	92	98	190
C. P. Dahlenburg	29	17	12	14	14	86	97	183
E. G. Hoffman	18	18	14	14	14	78	97	175
A. Schultz ..	24	17	11	14	13	79	95	174
C. F. H. Reichelt	25	16	12	10	13	76	90	166

Awards—Section 8.

The competition, which was commenced last year, is completed in 1925. The whole of the fallow and crops are judged each year, starting with the fallow. So far, Mr. W. E. Dahlenburg and Mr. Robert Blackwood have secured 279 points each, and E. G. Hoffman is next with 258.

Sampling the Soil with a Soil Auger.

Section 8.

Highest Aggregate for Whole of Fallow, 1923; Wheat on the Fallow, 1924; Whole of Fallow, 1924; Wheat on the Fallow, 1925.

Competitor.	Fallow, 1924.					Wheat, 1924.	Fallow, 1923.	Grand Total.
	Moisture.	Mulch.	Absence of Weeds.	Cultivation.	Total.			
Possible Points ..	**25**	**25**	**25**	**25**	**100**	**100**	**100**	**300**
W. E. Dahlenburg	25	23	24	22	94	92	93	279
R. Blackwood ..	25	25	25	24	99	88	92	279
E. G. Hoffman ..	25	21	22	22	90	74	94	258
A. Schultz ..	25	22	22	22	91	72	87	250
C. F. H. Reichelt	25	19	21	22	87	73	82	242

Awards—Section 9.

In this competition the prize is awarded for the highest aggregate obtained for the whole of the fallow 1924, and for the whole of the wheat grown on the fallow in 1925. The first year of the competition has been concluded, with the result that Mr. R. Blackwood has secured 99 points, and Mr. W. E. Dahlenburg 94, Mr. C. P. Dahlenburg being third with 93. Most of the fallows were excellent, and treatment given typical paddocks has already been described.

Section 9.

Highest Aggregate for—Whole of Fallow, 1924; Whole of Wheat, 1925.

Competitor.	Moisture.	Mulch.	Weeds.	Cultivation.	Total.
Possible Points	**25**	**25**	**25**	**25**	**100**
R. Blackwood	25	25	25	24	99
W. E. Dahlenburg ..	25	23	24	22	94
C. P. Dahlenburg ..	25	23	22	23	93
R. Blackwood & F. Kludge	25	21	24	22	92
Alfred Schultz	25	22	22	22	91
E. G. Hoffman	25	22	21	22	90
J. & T. W. Rintoule ..	25	21	22	22	90
G. H. Voight & Sons ..	25	21	22	21	89
C. F. H. Reichelt ..	25	19	21	22	87

Awards—Section 10.

There were three entries. Mr. T. G. Marshall was placed first with 84 points, and Mr. Victor Collins was second with 68. The winning crop was that which won in the section for Mallee crops, and the methods by which it was grown have already been described.

Section 10.—Best Wheat Crop on Red Fallowed Land not less than 75 Acres.

Competitor.	Yield.	Purity.	Absence of Weeds.	Absence of Disease.	Evenness.	Total.
Possible Points	**35**	**20**	**15**	**15**	**15**	**100**
T. G. Marshall	28	17	10	14	15	84
Victor Collins	17	14	11	13	13	68
Beacom Bros.	18	17	10	7	11	63

In conclusion, I desire to thank the secretary and members of the society for their kind consideration, assistance, and hospitality during the week spent in judging the exhibits.

WHEAT PICKLING.

THE NEW DRY PROCESS.

By H. A. Mullett, B.Ag.Sc., Senior Inspector of Agriculture.

Ninety per cent. of the wheat farmers of this State pickle their wheat to prevent ball smut, and where reasonable care is taken plants infected with the disease are comparatively few. Farmers do not always realize, however, that they gain this immunity at some cost, because pickling causes a loss of seed amounting, on the average, to 25 per cent., and what is worse, it reduces the speed of germination considerably. At first sight the destruction of 15 lb. out of every bushel sown may seem of more importance than interference with the speed of germination, for it would amount to twenty bags, worth £25, for every 100 acres sown. As few farmers sow less than 200 acres annually, they thus purchase their freedom from smut at a cost of about £50 on this score alone. But generally it is the slowing down of the rate of germination which causes the greatest loss. Recent tests conducted by the Department of Agriculture show that once unpickled wheat shoots above the surface of the ground, the bulk of it comes through in a few days' time. In one experiment conducted in February of this year 90 per cent. came through the surface during four days, whereas the germination of the grain treated with formalin, and some treated with bluestone, both at standard strengths, took twice as long. No shoots of the treated wheat appeared above the ground until two days after those of the unpickled wheat, and where formalin was used the germination was spread over nine days, while with bluestone it was seven days. In this experiment 40 per cent. of the wheat failed to germinate when pickled with formalin at standard strength (1 lb. to 40 gallons water with immersion for three minutes), while with bluestone the corresponding figure was 27 per cent. In another experiment, however, the wheat treated with formalin germinated slightly faster than that treated with bluestone, but both these were considerably slower than unpickled wheat.

Over a large portion of the State, especially in the Goulburn Valley, farmers begin to sow wheat about the middle of April, notwithstanding that the soil is usually in a dry condition at that time. Consequently the grain lies in the soil awaiting a shower of rain. If the rain is of short duration, and is followed by warm sunshine and drying winds, there is great danger of a tough surface skin forming on many of the paddocks. This obstructs the young wheat shoots, and many of them never succeed in penetrating the surface, and often the aeration is interfered with to such an extent that the grain goes mouldy and dies.

The wheat may require to be resown, and is often very thin, and while it has considerable tillering propensities, it usually fails to counterbalance the thin seeding by this means if the surface is set. When crops are sown under the conditions named great speed of germination

is obviously essential, because the longer the crop is straggling through the ground the greater the danger of its being trapped in the soil. Some farmers when sowing wheat on this class of land prefer to sow it unpickled; they chance smut rather than run the risk of a poor "strike." As the season progresses, and the wheat can be sown on moist soil, the speed of germination is not quite so important, but it again becomes a vital consideration when the weather grows colder and the soil more water-logged towards the end of the seeding season.

Many experimenters have recognized that bluestone and formalin as ordinarily used retard germination, and some have attempted to evolve methods that would avoid this drawback, but without much success until Dr. Darnell Smith, of New South Wales, discovered his dry copper process as a result of experiments commenced in 1915. Bolley tried a number of dry pickles in 1897, but did not succeed in obtaining a satisfactory powder. Von Tubeuf in 1902 tested copper carbonate dust as a fungicide, and although his records show that he secured promising results, curiously enough he appears to have dropped the work. In the new process the fungicide, finely ground, is dusted over the grain at the rate of 2 oz. a bushel. It is insoluble in water, and does not interfere with germination in any way. In the experiment quoted above, wheat treated with copper carbonate commenced to come through the ground two days later than unpickled wheat, but completed germination in four days, i.e., as quickly as unpickled wheat. In another experiment conducted in March, 88 grains were sown; both the unpickled wheat and that treated with copper carbonate took three days to come through the surface seven days after planting.

Table I.—Comparison of Rates of Germination following Various Methods of Pickling.

Federation Wheat pickled 3rd February, sown at Burnley, 5th February, 1925.

No. of Grains.	Pickle.	Total Number of Plants showing each Day.											
		Feb. 9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
40	Unpickled	3	9	25	35	35	35	36	38	38	38	38	38
40	Formalin (1/45, 3 min.)	..	..	1	5	10	15	17	22	23	23	23	24
40	Bluestone (1½%, 3 min.)	..	..	4	8	15	21	24	28	28	29	29	29
40	Copper Carb. (2 oz. per bushel)	..	.	3	26	32	34	34	34	34	34	35	36

Field Tests in Victoria.

In order to compare the efficiency as a bunticide of copper carbonate, bluestone, and formalin, some tests were carried out at Burnley School of Horticulture in 1923. The wheat was dusted with smut spores until it was black. About one part of smut was dusted over every 750 parts of wheat used. Thus the wheat was far more heavily smutted than wheat ever sown in practice.

Table II.—Percentage Germination and Percentage of Smutted Plants of Seed infected with Bunt, Pickled and Sown, 1923.

Treatment.	Percentage of plants matured.	Percentage of smutted plants.
Soaked in water	81 ..	68
Bluestone, 1½ per cent. ..	80 ..	3
Formalin, 1-450	70 ..	13
Copper carbonate, 2 oz. per bushel	88 ..	6

(Note.—Wheat was grown in nursery rows.)

It will be noticed that the number of plants in this experiment that reached maturity was greatest where the seed was treated with copper carbonate—greater even than the untreated seed. If this is not accidental, it suggests that copper carbonate may possibly exercise a productive action on the germinating grain against other forms of disease. For the purpose of testing the value of copper carbonate as a pickle when a quick germination is required, as it is for late sowing in most Goulburn Valley soils, some experiments were conducted last year at the farm of T. Roe, at Shepparton, where the soil is fairly typical of that of the district. There were three plots each one-third of an acre. One was sown to unpickled wheat, one to wheat pickled with standard bluestone, and one to wheat treated with copper carbonate (2 oz. per bushel). The whole of the wheat, which was sown at the rate of 72 lbs. per acre, was smutted sufficiently to blacken the grain. The results were as follows:—

Table III.—Smut Experiments, Shepparton, 1924.

Federation Wheat, heavily smutted, sown in July, at the rate of 72 lbs. per acre with 1 cwt. of superphosphate.

Treatment.	Yield per acre.
Copper carbonate, 2 oz. per bushel ..	15.1 bushel.
Bluestone, 1½ per cent. (3 minutes) ..	11.4 bushel.
Untreated	10.0 bushel.

The results indicate that the smutted wheat pickled with copper carbonate yielded 3.6 bushels per acre more than that treated with bluestone. The germination in this latter plot was much slower than the other two, while the crop appeared to be thinner. An inspection of the field at harvest time revealed that the untreated wheat was badly infected with smut, which was responsible for a reduction in yield of 5.1 bushels per acre as compared with the plot treated with copper carbonate. An approximate count of smutted and unsmutted heads in measured patches of each plot showed that about 68 per cent. of the heads on the untreated plot were smutted. Of the two pickles bluestone proved the most effective bunticide, because it almost completely eradicated the smut, whereas about 5 per cent. of the plants in the copper carbonate treated plot showed smut. However, in a test at Longerenong College 75 per cent. of the unpickled wheat was found to be smutted, whereas that treated with copper carbonate contained only 2 per cent. smutted heads.

In California, where similar experiments have been conducted on a more extensive scale, it has been noticed that where the wheat is so heavily smutted as to blacken the grain, bluestone is more satisfactory than copper carbonate, which, however, gives a smut-free crop unless the grain is unreasonably heavily infected.

Table IV.—Showing Comparison between Copper Carbonate, Bluestone, and Formalin as Bunticides on Wheat infected with Varying Quantities of Smut.

Results of Experiments conducted at Davis Farm, California, 1922.

Treatment.	Per Cent. of Plants Germinating in Field.	Proportions of Smut to Grain by Weight.						
		1 to 30.	1 to 250.	1 to 500.	1 to 750.	1 to 1,000.	1 to 1,500.	1 to 2,000.
		Percentage of Smutted Heads.						
Untreated	52·4	36·82	41·4	45·5	39·6	25·7	31·9	21·0
Bluestone, 2 per cent., 3 min.	33·2	6·3	·8	·6	·5	0·0	0·0	·1
Formalin, 1 in 400, 10 min.	34·7	0·0	·1	0·0	0·0	0·0	·1	0·0
Copper Carb., 2 oz. per bushel	56·5	46·5	9·4	·3	1·2	0·0	0·0	0·0
		Heavily smutted seed, black				Lightly smutted seed, just tinged.		

The above experiments were a continuation of some laid down in 1921, which they confirmed. A stronger solution of bluestone was used than is standard in Victoria, while the formalin was applied for ten minutes instead of three, our standard. The results indicate that for heavily-smutted wheat the ordinary pickling solution is more effective than copper carbonate, which, however, completely suppresses the smut provided it is not present in sufficient quantity to blacken the grain. As no one cares to sow wheat as smutty as this, it is therefore quite satisfactory in ordinary farming practice.

Effective Mixing Necessary.

From the foregoing it should be clear that the copper carbonate process is a very finely adjusted method. The pickle is just powerful enough to prevent smut infection, provided it is not present in abnormal quantities, and because of this comparative weakness, copper carbonate does not hurt the germination of the grain. Then, again, a powder is usually more difficult to apply than a solution which penetrates a mass of grain readily and adheres to grain easily. Therefore, the margin of safety is rather less with copper carbonate than it is with either bluestone or formalin, but the farmer is taking no risk with the new method if he knows how to use the powder. It is important that the copper carbonate should be thoroughly mixed with the wheat, and the method used must ensure that each grain is thoroughly coated. The degree with which this is done depends on the fineness of grinding of the powder and on the method of mixing. To pickle a bushel or two as an experiment, an oil drum fitted with a spindle through the middle of the sides is satisfactory. The drum

should not be more than half filled with wheat, and it should be slowly rotated end for end for not less than three minutes. For pickling on a large scale an automatic mixing machine should be employed. There are machines which add the powder in measured quantities to the wheat as it enters the machine where the mixing takes place, generally by a rotary movement, and in one machine by a combination of this and archimedean worms. Up-to-date machines are fitted with a sieve for removing any surplus powder before the wheat enters the bagger. Too much powder cannot hurt the wheat, but any excess is waste. Good machines should have all joints so close that the powder cannot fly about, as it is most objectionable if inhaled. If a double-bagging arrangement be provided it lessens the dust, and makes for expedition in handling. The wheat may be pickled any time after harvest or immediately before sowing.

Standard Powder Essential.

Careful tests made at the Berkeley University have shown that the effectiveness of copper carbonate as a bunticide depends on its purity and on its "covering power." Copper carbonate diluted with lime or with gypsum was found less effective than the pure substance and in proportion to the amount of the dilution. It was also shown that as each grain of wheat can only take up a certain amount of powder, the adulteration may be so great as to allow some of the smut spores on the grain to escape contact with the copper carbonate, and hence permit of infection. Again, the powder needs to be so finely ground that it will closely adhere to all parts of the grain, particularly in the crease and to the brush in which many spores are often entangled. Coarse powders do not adhere well, hence the spores on part of the grains may not have the copper carbonate antidote near them. Fine powders fly into the air better than coarse powders, and therefore are more effectively distributed over the grain.

The following specifications are recommended by the Berkeley authorities as a result of exhaustive tests with various grades of copper carbonate.

(1) *Purity*—

Samples should contain from 50 to 55 per cent. copper, and consist of basic copper carbonate (copper carbonate, 52 to 54 per cent.; and copper hydrate, 39 to 42 per cent.).

(2) *Fineness*—

Ninety per cent. in aqueous solution should pass through a 200 mesh sieve.

(3) *Density*—

After shaking down dry, not more than 32 lb. per cubic foot.

A number of brands of copper carbonate for dry pickling have been put on the market in this State. How they compare with the above standard will be seen by the following table drawn up from figures furnished by the Chemist for Agriculture, Mr. P. R. Scott.

Table V. — Showing Comparison between Standard Copper Carbonate approved by University of California and several Brands sold in this and other States.

Brand.	Copper. Per Cent.	Lime (CaO).	Density. (Weight per Cubic Foot.)
A	55·7	1·38	31·3 lbs.
B	40·60	5·10	54 „
C	53·24	2·38	54·5 „
D	59·54	·34	34·7 „
E	54·49	1·62	56·8 „
F	47·57	5·56	52· „
Standard	50·55	..	31 „

Sample A approximates most closely to the Californian standard; B and F show a low percentage of copper, and they are coarse; C and E are also very coarse; D is not copper carbonate at all, but is pure copper hydroxide; B and F contain a quantity of lime compounds. It is clear, therefore, that the local samples diverge fairly widely from that approved in California. In order to determine a standard for Victoria it is proposed to lay down some field and laboratory tests, and legislation for the purpose of fixing a standard grade of powder is contemplated. Until this standard has been ascertained it would be safer for purchasers of copper carbonate to insist that copper carbonate be reasonably close to the American specifications. The new process has given rise to considerable local industry with manufacture of powder and of pickling machines. It is somewhat more costly than the older methods, but there are indications that a new copper preparation which is said to be effective may be put on the market at a much cheaper rate.

IMPROVING THE OAT YIELD.

Owing to the ousting of horses by motor vehicles in the metropolis, growers of oats for hay or grain in the Werribee-Geelong area have been feeling the pinch of declining prices. The remedy is undoubtedly the substitution of crops like wheat, barley, and peas for portion of the oat crop, and the production of the reduced acreage of oats with greater efficiency. Recent experiments at the Research Farm, Werribee, and on another experimental plot in the district suggest how this can be done.

The results from the experimental plots conducted for the Agricultural Department by Mr. J. Johnston, of Winchelsea, are now available. The field comprises nine manurial and five variety tests with oats—fourteen altogether. The soil is black volcanic loam of good quality, and typical of considerable areas in the Buckley district. A paddock of natural pasture was also laid out as a top-dressing test.

The results of the experiment again serve to demonstrate that superphosphate is the predominant fertilizer for cereal crops, and they emphasize the fact that it pays to use it in heavier quantities per acre than are usually applied. The plot treated with 2 cwt. per acre yielded 5.5 bushels of oats more than the plot treated with 1 cwt. per acre. At 2s. 6d. per bushel, the extra oats produced is thus worth 13s. 9d., whereas the extra manure to produce it costs only 5s., leaving a clear profit of 11s. 3d. per acre.

Both lime and gypsum applied at the rate of 1 ton per acre have increased the yield somewhat, though the question as to whether it is profitable to use either will depend on the number of years the heavy application lasts. Gypsum, 1 ton per acre, applied by itself, appears to have produced an increase of 13.7 bushels per acre, whereas lime by itself was responsible for an increase of only 3.9 bushels. As it is unusual for either lime or gypsum to raise the yield of cereals when applied without superphosphate, this portion of the result should be accepted subject to confirmation by additional experiments.

Ammonium sulphate when used with superphosphate has not increased the yield due to superphosphate.

Of the various oat varieties none proved better than ordinary Algerian. Palestine—a new variety raised by the Department at its Research Farm, Werribee, from a few seeds supplied by Dr. Cherry, who brought them from Palestine—has given yields practically equal to Algerian. Palestine is from ten to fourteen days earlier than Algerian, and hence there is a place for it on most farms, as it will enable the harvest to be commenced earlier. It is, however, short strawed, and therefore not likely to be productive of heavy yields of hay. The grain is similar to Algerian. The crossbred oats rusted badly.

Results.

Manurial Tests.

Plots sown 10th May with 62 lbs. seed per acre, and 2 cwt. superphosphate.

	Yield per acre. Bushels.
Superphosphate, 1 cwt. per acre	56.5
Superphosphate, 2 cwt. per acre	62.0
Superphosphate, 3 cwt. per acre	63.0
Lime, 20 cwt.	48.5
Super. 2 cwt., lime 20 cwt.	65.8
Super. 2 cwt., Gypsum 20 cwt.	65.6
Gypsum, 20 cwt.	58.3
No manure	44.6
Super. 2 cwt., ammonium sulph. 40 lbs.	61.3

Variety Tests.

62 lbs. seed and 2 cwt. super. per acre.

Mortgage lifter oats	52.2
Algerian	52.9
Palestine	52.3
Wild oats x Ruakura (W5003-16-13)	35.2
Wild oats x Ruakura (W5003-14-1)	41.5

FERTILIZERS AND THE FERTILIZER INDUSTRY.

(Continued from page 248.)

By P. Rankin Scott, Chemist for Agriculture, and Will C. Robertson, Supervising Analyst.

SUPERPHOSPHATE—(*continued*).

Having quantities of sulphuric acid and rock phosphate at the works, the actual manufacture of superphosphate may be commenced. The cargoes of rock phosphate in bulk are unloaded at the wharf, either into drays or trucks, and thence are usually sent to the "dump" or "storage" at the works. In some instances, however, the load, after weighing, is tipped from the dray into a conveyor to be sent into the "works storage," which, in this case, adjoins the wharf. It goes without saying that it is essential for the cargoes of raw material to be weighed in a practical and economical manner. Automatic weighing machines are installed, which, while weighing correctly, do not seriously interfere with the task of unloading.

The rock phosphate from the dump is brought as and when required to rock breakers or grinding mills, where it is ground to a fine powder, and afterwards sent to the weighing platform, situated close to the grinding apparatus, and elevated sufficiently to permit the rest of the working plant to be installed thereunder.

As the fine rock phosphate powder is conveyed to the weighing platform, so, too, is the sulphuric acid ("chamber" or "works" strength) transported from the sulphuric acid plant. The analysis or strength of both the sulphuric acid and phosphate powder is carefully and regularly controlled by a staff of fully qualified chemists—really the only difficult part of "super." manufacture, and one of paramount importance.

A definite quantity of the phosphate powder containing a known quantity of phosphoric acid (and foreign interfering substances) is next weighed, and run into the mixing machine, situated either underneath or adjoining the weighing machine), together with the calculated quantity of sulphuric acid.

The "mixer," in which the manufacture or formation of superphosphate takes place, stands on a platform, over the empty chambers termed "bins," "dens," or "pits." It consists of a cylinder sometimes nearly horizontal, sometimes vertical, furnished in the centre with a revolving shaft carrying arms set on screw-wise. As the charge of phosphate-powder and acid enters the "mixer," the revolving screw agitates the mass. The agitation is continued for a couple of minutes to ensure thorough admixture, and then a valve is opened, and the contents discharged into the "den" below. The "dens" hold from 60 to 150 tons, usually 100 tons.

Two types of "mixers" are utilized—one termed a "batch" mixer, in which the superphosphate is made in batches; the other is of the continuous type, the raw materials being continually fed into the "mixer,"

and "super" being continually discharged. The fluid material which enters the pit, rapidly reaches a temperature exceeding that of boiling water, and then becomes solid. In a few hours it is ready to be excavated.

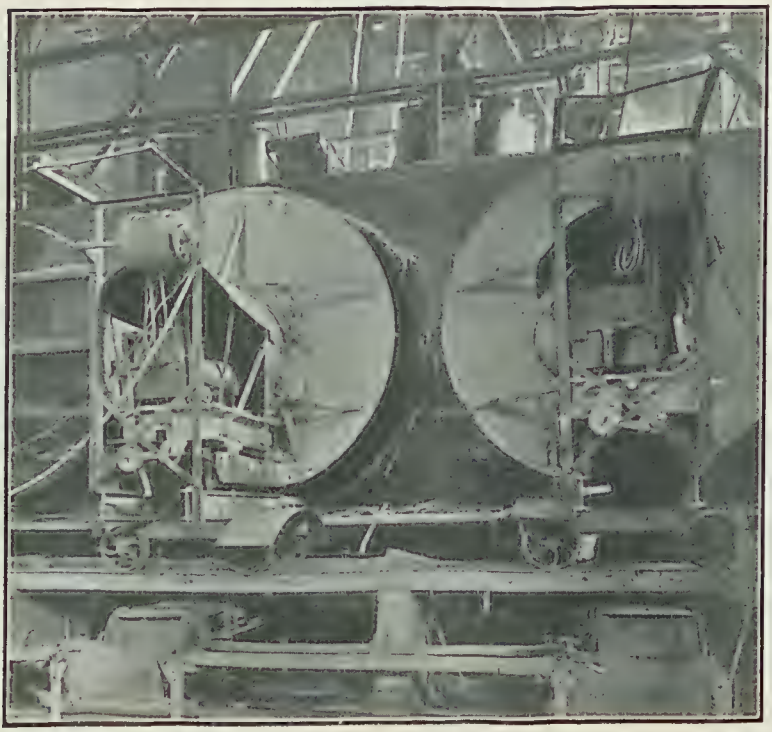
Years ago, the excavation of the superphosphate from the "dens" was accomplished by the simple means of digging it out with shovel and pick, but this method has been superseded by the use of mechanical apparatus. The mechanical excavator—an illustration of which is shown on page 292) consists of an arm extending from a staging which travels on rails laid in front of the "den" door.

A Dump of 20,000 Tons of Superphosphate.

The arm is furnished with travelling knives and scrapers, and it revolves on a pivot around the staging as a centre, so that it can be swung in and out of the pit, and be made to reach every part of it. When the knives and scrapers are set in motion the superphosphate is scraped forward, and dropped on to a conveyor traversing the front of the pit, whence it is elevated to the storage "dump."

The excavator is so constructed that the arm is made to move from left to right, and vice versa, and lowers itself automatically as the "super." is removed. During the reaction between the phosphate powder and the sulphuric acid in the "mixer" and "dens," noxious gases are evolved; these are conducted to the open air by a system of fan exhausts and flues.

Well-made superphosphate appears as a stone-grey or yellow-white porous powder, all depending on the rock phosphate from which it is produced. Sometimes it takes the granular form—a matter of works practice—and years ago, during the days of the drill infancy, the granular superphosphate was very much in favour, mainly because it was free-running. In some instances, however, particularly in the case of the lighter soils, when small dressings of superphosphate were considered advisable, the granular superphosphate had the disadvantage of running too freely. It matters little, however, whether the super-



Battery of "Dens" and Excavator. (Note mixer above.)

phosphate is in the powder or granular form; the main thing is the moisture content, or its physical condition for drilling purposes, and its chemical composition as regards available phosphoric acid.

The farmers' requirements of superphosphate in Victoria are largely for January, February, March, April, and May delivery (the tendency in recent years is to prolong the delivery season, due to the system of late sowing coming into favour). It therefore follows that the factories, being in continuous operation, are manufacturing superphosphate in excess of demand at certain periods of the year, and vice versa during

the months quoted. Hence the necessity for storage, apart altogether from the advantage of maturation; for chemical reaction does not cease in the "bin" or "den," but still goes on to a lesser extent in the "dump" The "dump" superphosphate is usually roughly ground and screened prior to its entering the bagging machine, where it is automatically weighed into branded sacks, which are labelled and sewn by hand or machine, and elevated to the railway trucks for dispatch to various parts of the country.

Elevating "Super" from Bagging Machine into Truck for Dispatch to the Country.

Ordinary superphosphate made from the high grade Nauru rock phosphate is termed "22 per cent.", meaning containing 22 per cent. phosphoric acid, practically the whole of which is soluble in water.

Until recently, the practice was to "break" the superphosphate down slightly by the admixture of a small amount of sand—the idea being to give it a better physical condition for drilling purposes.

The guarantee of the old type superphosphate in Victoria was 17 per cent. water soluble phosphoric acid, with .5 per cent. citrate soluble and .5 per cent. citrate insoluble phosphoric acid. This grade is to be taken off the market. The guarantee of the "22 per cent.," or the recent grade of superphosphate, is 21 per cent. water soluble phosphoric acid, with .5 per cent. citrate soluble, and 1 per cent. citrate insoluble phosphoric acid, which shows a difference of 4 per cent. water soluble and .5 per cent. citrate insoluble phosphoric acid to the advantage of the "22 per cent." superphosphate. The difference in the price per ton distinctly favours the "22 per cent. super.," and, furthermore, as the farmer requires a smaller quantity of the richer fertilizer, there is a saving in freight charge. On the other hand, the higher content of water soluble phosphoric acid, with the increase in the free phosphoric content, will (*a*) have a more corrosive action on the bags and drilling machine, and (*b*) in moist weather tend to make the superphosphate clog in the drill.

As cornsacks are imported at an average cost to the Victorian farmer of, say, 7s. 6d. per dozen—representing in round figures £60,000 a year to the State—and as the life of a superphosphate bag will depend largely on the percentage of free acid contained in the fertilizer, and this percentage increases with the percentage of water-soluble phosphoric acid contained in the superphosphate, it follows that any system or method in superphosphate manufacture which helps in bag preservation will be a factor in reducing the price of fertilizers. A good, sound bag which has contained superphosphate would command ready sale as a No. 1 potato bag.

There is a regulation under the Health Act prohibiting the use of bags which have contained fertilizer (including superphosphate) as receptacles for oats, maize, potatoes, &c. This regulation is of long standing, and in all probability, when it was framed, some superphosphate was being manufactured from bones, and the fact that particles might cling to the bag may have been looked upon as a danger from the hygienic stand-point. However, superphosphate manufactured, as at present, from mineral rock and sulphuric acid, practically arsenic free, can hardly be regarded as a menace, and bags which have contained superphosphate, sulphate of ammonia, or potash salts could, if sound, be utilized over and over again as receptacles for swedes, potatoes, oats, maize, &c., without fear of any deleterious effect. This would indirectly result in decreasing the price of superphosphate some shillings per ton —a direct saving of, perhaps, £30,000 per year to the State. The use of bags which have held bonedust, bone and blood, bone and "super.," dried blood, and all mixed fertilizers for carrying foodstuffs should continue to be prohibited; as a matter of fact, their odour would forbid their use.

Under the Fertilizers Act, superphosphate is classed as a fertilizer, and therefore all bags containing it have to be branded with a registered brand, and labelled with a guarantee as to its composition so far as the various forms of phosphoric acid are concerned. The net weight in pounds must also be stated, as well as the place of manufacture, and name and address of manufacturer.

The following is an illustration of the requisite label:—

MANUFACTURED AT FOOTSCRAY

BROWN PTY. LTD.

BROWN'S SUPERPHOSPHATE

Containing—

Phosphoric Acid—Water Soluble	-	21·00 %
" " Citrate "	-	·50 %
" " Citrate Insoluble	-	1·00 %
" " Total	-	22·50 %

NET WEIGHT 187 LB.

1530 COLLINS ST., MELBOURNE

The matter contained in the foregoing pages will give some idea of the importance of the superphosphate industry in Victoria, and the illustrations will, in a small way, indicate the size of the factories, together with the machinery required, and the capital and labour involved. The largest factory in the State probably has an output of 70,000 tons of superphosphate per annum, and it is interesting to record that, to the best of the writer's belief, the largest superphosphate factory in the world has an output of 300,000 tons per annum.

The welfare work associated with the superphosphate works of Victoria is well worthy of remark. The continental system of catering for the comfort and health of the employees is closely followed, and at most of the factories there is a spacious dining hall with a kitchen adjoining. The menu would cause even the average farmer's wife to comment favorably. A piano is provided in every Y.M.C.A. hut at the factories, and shower baths and dressing rooms are available.

The workmen at one of the leading factories are permitted to fill in their spare moments in making toys for Santa Claus, and the Christmas tree at the end of the year, when the children of the workmen attend to receive the gifts. The workmanship of the toys is excellent, and last year their value was assessed at considerably more than £100.

The spirit of good will between employer and employee, if judiciously fostered, must be to the advantage of all, and in the superphosphate industry of Victoria the welfare work reflects the greatest credit on those whose duty it is to carry it out and on.

(To be continued.)

CORRECTION.

On page 243 of this *Journal* for April, in the second paragraph of the explanatory key to the illustration of the Glover Tower, the words "strong sulphuric acid" should have read "weak sulphuric acid", as a reference to the flow sheet on page 242 will show.

REGISTRATION OF STALLIONS.

Fifth Annual Report under Horse Breeding Act 1919.

By W. A. N. Robertson, B.V.Sc., Chief Veterinary Inspector.

It is pleasing to record that, notwithstanding the pessimistic utterances of some breeders, the draught horse breeding industry in Victoria is progressing along slow but regular lines, and it is sincerely to be hoped that no sudden boom will set in, which must inevitably lead to serious depression. Figures show that, since the inception of the Act, there has been a steady increase in the number of draught stallions brought forward for examination.. In 1920, the first year of compulsory registration, 516 were submitted. The reason for this high number was that it was mandatory that every stallion which had not been awarded a life certificate under departmental Regulations, should be submitted for examination. In 1921, 311 were examined; in 1922, 347; in 1923, 356; and last year (1924), 382.

There has been a decline in the number of light horses and ponies presented for inspection. With the rapid increase in motor cars and delivery wagons, this was only to be expected, and unless an export market can be found for horses of these classes, their numbers must decline still further. The numbers for the five years are:—

	Light Horses.	Ponies.
1920 ..	391 ..	192
1921 ..	196 ..	101
1922 ..	189 ..	100
1923 ..	174 ..	64
1924 ..	133 ..	70

Yet there has been an increase in the number of stallions registered each year since the Act became operative. The following are the figures:—

Year.	Total Number Registered.
1920	1,177
1921	1,377
1922	1,565
1923	1,600
1924	1,618

This development is, of course, due to an increase in the number of draught horses, for though the motor-drawn vehicle may oust some draughts, the day is far distant when it will displace the horse on the farm. In 1923, there were 755 of the draught class registered, and last season the number was 814.

Last session an amending Bill was introduced into Parliament with the object of making for smoother working of this piece of legislation, and to give effect to suggestions made by breeders throughout the State. The Bill provided for the establishment of a fund from which compensation could be paid to the owner of a stallion which, once having been registered, was at a subsequent examination refused registration owing to some unsoundness having developed. It was also to be enacted that a stallion, having once passed the examination for approved standard, could not subsequently be rejected on this count. Another provision would have allowed an owner to hold a stallion, rejected on first examination, for further examination as a 4 or 5 year old, and

thus give an opportunity to the owner to show that, with maturity, the horse had developed sufficiently to warrant a certificate being used. The Bill, unfortunately, could not, in the limited time available, be finally dealt with; but it is hoped that it will be re-introduced next session; and, in this regard, the following resolution passed at the recent Convention of the Chamber of Agriculture, expresses the desire of the majority of breeders:—

> That this Convention affirms the necessity for amendments to the Horse Breeding Act, and that the Minister for Agriculture be asked to re-introduce the Bill introduced to Parliament at the last session as early as possible; further, that the amendment suggested in the Legislative Council to permit an owner to use an unregistered stallion on his own mares does not meet with the approval of this chamber.

Analysis of Last Season's Work.

During last season, 231 parades were held, and 585 stallions were presented for examination. Of this number, 494 were registered; 29 were refused registration because of unsoundness, and 62 on account of disapproval. The total percentage of unsound animals indicates a decline from 7.25 per cent. during the previous year to 4.96 last season. Examination of the table showing the details of examination reveals that this decrease is almost wholly due to a decline in rejections of draught stallions. In 1923, 9.83 per cent. of this class were unsound, last year only 5.75 per cent. The disability present in most of those rejected on account of unsoundness was sidebone; but it is very gratifying to note the small proportion of horses in which this disease was noticed as compared with the numbers of some years ago. During the early years of examination, before compulsory registration was introduced, an average of 13 per cent. of draughts was affected with sidebone. Since registration was made obligatory, there has been a steady decline to 3.4 per cent. last season.

From these facts, it is evident that we are within measurable distance of the day when sidebone will become a rarity. Many years must elapse, however, ere its complete eradication can be looked for, because there is no control ove the mares used for breeding; but even this factor will become less and less potent as generations of sounder sires are used.

Ringbone was found in only 3 draughts last season, as against 9 the previous year.

Amongst light horses, only 7, or 5.26 per cent., out of the 133 examined were unsound; and in the case of 4, or 3.01 per cent., the presence of bone spavin was assigned as the reason for rejection.

In the pony class, the unusual result is recorded of none of the 70 examined being unsound.

The total number of horses of all classes refused registration on the ground of disapproval was 62, or 10.59 per cent.—a slight decrease as compared with 1923, when the percentage was 11.28. Though in the case of light horses and ponies there was a decline in the number rejected on this head, the number of draughts whose rejections were due to disapproval showed an increase over last year of 1.38 per cent.

Appeals.

The number of appeals lodged against the decision of the Veterinary Officers was fourteen. Ten of the rejects were draughts, three were

light stallions, and one a pony. Three appeals, all in the case of draughts, were upheld—two on the question of approval, and one where registration had been refused because of stringhalt. In the case of the other seven draught stallions, in which the cause for rejection was given as "disapproval," the Veterinary Officers' decisions were not disturbed. The reason for refusing to register the three light stallions and the pony was disapproval, and in these four cases the decisions were not disturbed.

Parades for Coming Season.

Some difficulty has been experienced in arranging the time-table for the coming season because, at several of the larger centres, notably Melbourne and Nhill, parades have been arranged to be held much later in the season than heretofore. The opinion is also held in several other centres that the dates of most of the parades are too early. On the other hand, a number of complaints are made that some of the parades are held too late, and that consequently owners have no opportunity of making arrangements for the season, especially in those cases where the registration is refused. The position, summed up, is that practically every centre desires its parade during August or early September. To accede to the wish of them all, and conduct over 200 parades in such limited period, is impossible, for in order that every centre might be visited before the Royal Show, it would be necessary for parades to commence in the last week in June. It should be borne in mind that the time-table has been arranged so that the work of inspection throughout the State may be accomplished as expeditiously as possible. To make an alteration now in the date of any one parade would necessitate consequential changes, and so cause delay and inconvenience in a great many centres.

Owners of stallions should study the schedule of parades, and having decided at which they will present their stallion, insert the name of that place in the space provided therefor in the form of application for registration.

It will not necessarily follow that because a parade is listed in the schedule that a veterinary officer will attend there. In fact, if no owner has notified his intention of presenting his horse there, an officer will not attend. If a parade be not held on the date set down, it may be impossible to arrange for a second one until after the season has opened, as the Veterinary Staff will be fully engaged right up to the time of the Royal Show.

Application for registration should be made before the 1st July, and if owners comply with all requirements the veterinary officers will be prepared to inform them of the result of the examination on parade day.

Forms of application may be obtained from secretaries of Agricultural Societies and from the officer in charge of all police stations, to whom I desire to again record my thanks for assistance during the past year.

All registrations except those made after the 1st April of this year automatically terminate on 30th June next. Owners should carefully note that if a stallion changes ownership in any way the registration will expire within thirty days, unless due notice is given and the certificate of registration suitably indorsed.

STALLION PARADES.

TIME TABLE, 1925.

Provided that the applications for registration received indicate that a horse will be in attendance there for examination, a parade will be held at each of the following places :—

No. and Date.	Parade.	Time.	Officer Arrives.	Officer Departs.
Every Saturday from June 27 to Dec. 19	Agricultural Offices	10 a.m.		
No. 1.				
Monday, June 22 ..	Dunolly ..	1.41 p.m.	1.41 p.m. ..	3.35 p.m.
Monday, June 22 ..	Maryborough	4.30 p.m.	4.30 p.m. ..	10.20 p.m.
Tuesday, June 23 ..	Mildura ..	2 p.m. ..	7.50 a.m. ..	7.25 a.m. (24th)
Wednesday, June 24..	Ouyen ..	10 a.m. ..	9.35 a.m. ..	Driving
Wednesday, June 24..	Walpeup ..	12 noon ..	Driving ..	Driving
Wednesday, June 24..	Underbool ..	2 p.m. ..	Driving ..	Driving
Wednesday, June 24..	Tutye ..	3.30 p.m...	Driving ..	Driving
Wednesday, June 24..	Murrayville..	4.30 p.m.	Driving ..	Driving
No. 2.				
Monday, June 22 ..	St. Arnaud	3.30 p.m.	3.22 p.m. ..	12.4 a.m. (23rd)
Tuesday, June 23 ..	Speed ..	9 a.m. ..	4.12 a.m. ..	10.54 a.m.
Tuesday, June 23 ..	Woomelang	11.45 a.m	11.45 a.m. ..	11.52 a.m. (24th)
Wednesday, June 24..	Watchem ..	1.34 p.m.	1.34 p.m. ..	6.52 p.m.
Thursday, June 25 ..	Curyo ..	9 a.m. ..	Driving ..	Driving
Thursday, June 25 ..	Birchip ..	11 a.m. ..	Driving ..	1.8 p.m.
Thursday, June 25 ..	Donald ..	2.30 p.m...	2.16 p.m. ..	5.55 a.m. (26th
No. 3.				
Tuesday, June 23 ..	Sea Lake ..	10 a.m. ..	9.10 p.m. (22nd)	Driving
Tuesday, June 23 ..	Nandaly ..	12 noon ..	Driving ..	Driving
Tuesday, June 23 ..	Kulwin ..	3 p.m. ..	Driving ..	Driving
Wednesday, June 24..	Culgoa (Railway Station)	9 a.m. ..	Driving ..	9.54 a.m.
Wednesday, June 24..	Wycheproof (Railway Station)	11.40 a.m.	11.40 a.m. ..	12.25 p.m.
Wednesday, June 25..	Charlton (Railway Station)	1.5 p.m.	1.5 p.m. ..	1.22 p.m.
No. 4.				
Monday, June 29 ..	Mitiamo (Railway Station)	1.25 p.m.	1.25 p.m. ..	1.43 p.m.
Monday, June 29 ..	Pyramid (Railway Station)	2.6 p.m. ..	2.6 p.m. ..	7.10 a.m. (30th)
Tuesday, June 30 ..	Raywood ..	11 a.m. ..	9.18 a.m. ..	12.50 p.m.
Tuesday, June 30 ..	Tandarra ..	1.5 p.m. ..	1.4 p.m. ..	4.42 p.m.
Wednesday, July 1 ..	Bendigo ..	10 a.m. ..	6.10 p.m. (30th)	12.12 p.m.
Wednesday, July 1 ..	Marong ..	1 p.m. ..	12.41 p.m. ..	5.13 p.m.
Thursday, July 2 ..	Maldon ..	11.45 a.m.	11.32 a.m. ..	Driving
Thursday, July 2 ..	Shelbourne ..	1.30 p.m...	Driving ..	Driving
Thursday, July 2 ..	Castlemaine	4 p.m. ..	3.30 p m ..	8.40 p.m.
Friday, July 3 ..	Newstead ..	10.30 a.m.	9.18 p.m. (2nd)	11.31 a.m.

STALLION PARADES, TIME TABLE—*continued.*

No. and Date.	Parade.	Time.	Officer Arrives.	Officer Departs.
No. 5.				
Monday, June 29 ..	Ballan ..	10.15 a.m.	10 a.m. ..	12.2 p.m.
Monday, June 29 ..	Bacchus Marsh	1 p.m. ..	12.34 p.m. ..	Driving
Monday, June 29 ..	Melton ..	3 p.m. ..	Driving ..	8.50 p.m.
Tuesday, June 30 ..	Riddell (Railway Station)	2.14 p.m.	2.14 p.m. ..	2.44 p.m.
No. 6.				
Tuesday, June 30 ..	Dimboola ..	9.30 a.m.	6.5 p.m. (29th)	11.45 a.m.
Tuesday, June 30 ..	Rainbow ..	2.45 p.m...	2.45 p.m. ..	3.50 p.m.
Tuesday, June 30 ..	Yaapeet ..	4.40 p.m...	4.40 p.m. ..	5.30 p.m.
Wednesday, July 1 ..	Kaniva ..	2 p.m. ..	2.5 a.m. ..	12.42 a.m. (2nd)
Thursday, July 2 ..	Jeparit (Railway Station)	10.8 a.m.	10.8 a.m. ..	10.55 a.m.
Thursday, July 2 ..	Lorquon (Railway Station)	11.40 p.m.	11.40 p.m. ..	12.5 p.m.
Thursday, July 2 ..	Yanac (Railway Station)	1.20 p.m...	1.20 p.m. ..	1.40 p.m.
No. 7.				
Monday, June 29 ..	Rupanyup (Railway Station)	4.40 p.m...	4.40 p.m. ..	5.5 p.m.
Tuesday, June 30 ..	Marnoo ..	9.30 a.m.	6.25 p.m. (29th)	10 50 a.m.
Tuesday, June 30 ..	Lubeck (Railway Station)	1.10 p.m.	1.10 p.m. ..	1.28 p.m.
Tuesday, June 30 ..	Stawell ..	2.25 p.m...	2 25 p.m. ..	Driving
Tuesday, June 30 ..	Glenorchy ..	4.30 p.m...	Driving ..	Driving
Wednesday, July 1 ..	Ararat ..	2 p.m. ..	8.35 p.m. (30th)	6.20 a.m. (2nd)
Thursday, July 2 ..	Avoca ..	9.30 a.m.	8.20 a.m. ..	3.40 p.m.
No. 8.				
Tuesday, July 7 ..	Goroke ..	3 p.m. ..	1.15 p.m. ..	6 p.m.
Wednesday, July 8 ..	Horsham ..	9 a.m. ..	9.5 p.m. (7th) ..	5.50 p.m
Thursday, July 9 ..	Natimuk ..	10 a.m. ..	7 p.m. (8th) ..	Driving
Thursday, July 9 ..	Toolondo ..	12 noon ..	Driving ..	Driving
No. 9.				
Monday, July 6 ..	Macorna ..	3 p.m. ..	2.26 p.m. ..	11.17 p.m.
Tuesday, July 7 ..	Koondrook..	9.30 a.m...	Driving ..	Driving
Tuesday, July 7 ..	Kerang ..	2 p.m. ..	Noon	3.55 p.m.
Wednesday, July 8 ..	Piangil ..	9.30 a.m.	Driving ..	Driving
Wednesday, July 8 ..	Manangatang	11 a.m. ..	Driving ..	Driving
Wednesday, July 8...	Chillingollah	Noon ..	Driving ..	Driving
Wednesday, July 8 ..	Ultima ..	3 p.m. ..	Driving ..	Driving
Wednesday, July 8 ..	Lalbert ..	4 p.m. ..	Driving ..	Driving
Thursday, July 9 ..	Swan Hill ..	10 a.m. ..	Driving (8th) ..	12 noon
No. 10.				
Wednesday, July 8 ..	Inglewood ..	11 a.m. ...	10.2 p.m. (7th)	1.29 p.m.
Wednesday, July 8 ..	Boort ..	4.5 p.m. ..	4.5 p.m. ..	4.30 p.m.
Thursday, July 9 ..	Quambatook	10 a.m. ..	5.30 p.m. (8th)	11.50 a.m.
Thursday, July 9 ..	Korong Vale	2.32 p.m...	2.32 p.m. ..	3.25 p.m. (9th)
Friday, July 10 ..	Wedderburn (Railway Station)	2.35 p.m...	2.35 p.m. ..	3.10 p.m.

STALLION PARADES, TIME TABLE—*continued.*

No. and Date.	Parade.	Time.	Officer Arrives.	Officer Departs.
No. 11.				
Tuesday, July 14 ..	Hopetoun ..	11 a.m. ..	10.20 p.m. (13th)	7.20 a.m. (15th)
Wednesday, July 15..	Warracknabeal	2 p.m. ..	10 a.m. ..	6.50 p.m.
Thursday, July 16 ..	Beulah ..	9.30 a.m...	8.20 p.m. (15th)	12.5 p.m.
Thursday, July 16 ..	Minyip ..	3.15 p.m...	3.10 p.m. ..	11.45 a.m. (17th)
Friday, July 17 ..	Murtoa (Railway Station)	12.35 p.m.	12.35 p.m. ..	1.10 p.m.
No. 12.				
Monday, July 13 ..	Tungamah ..	1.30 p.m...	1.15 p.m. ..	3.21 p.m.
Monday, July 13 ..	Devenish ..	4 p.m. ..	4 p.m. ..	8.43 p.m.
Tuesday, July 14 ..	Yarrawonga	11 a.m. ..	9.52 p.m. (13th)	2.45 p.m.
Wednesday, July 15..	Benalla ..	9.30 a.m.	5.10 p.m. (14th)	11.25 a.m.
Wednesday, July 15..	Rutherglen	2 p.m. ..	1.53 p.m. ..	7.50 a.m. (16th)
Thursday, July 16 ..	Barnawartha	2 p.m. ..	1.25 p.m. ..	3.28 p.m.
No. 13.				
Monday, July 13 ..	Tallangatta..	4 p.m. ..	3.53 p.m. ..	Driving (14th)
Tuesday, July 14 ..	Corryong ..	12.30 p.m.	Driving ..	Driving (15th)
Wednesday, July 15..	Wodonga (Railway Station)	12.45 p.m.	12.45 p.m. ..	3.5 p.m.
No. 14.				
Monday, July 20 ..	Kyabram ..	1.30 p.m...	12.11 p.m. ..	Driving
Monday, July 20 ..	Tongala ..	3 p.m. ..	Driving ..	4.26 p.m.
Tuesday, July 21 ..	Tatura ..	10.30 a.m.	5.27 p.m. (20th)	11.30 a.m.
Tuesday, July 21 ..	Echuca ..	1.15 p.m...	1.15 p.m. ..	3.45 p.m.
Tuesday, July 21 ..	Rochester ..	4.30 p.m...	4.25 p.m. ..	9.3 a.m. (22nd)
Wednesday, July 22	Elmore ..	11 a.m. ..	9.40 a.m. ..	Driving
Wednesday, July 22	Lockington ..	2.15 p m...	Driving ..	Driving
Thursday, July 23 ..	Gunbower ..	4 p.m. ..	4 p.m. ..	Driving
Friday, July 24 ..	Cohuna ..	11 a.m. ..	Driving ..	1.30 p.m.
No. 15.				
Monday, July 20 ..	Moyhu ..	2 p.m. ..	Driving ..	Driving
Monday, July 20 ..	Whitfield ..	4 p.m. ..	Driving ..	Driving
Tuesday, July 21 ..	Wangaratta	10.30 a.m.	Driving ..	12.39 p.m.
Tuesday, July 21 ..	Bright ..	4.7 p.m. ..	4.7 p.m. ..	6.4 a.m. (22nd)
Wednesday, July 22	Myrtleford ..	2 p.m. ..	7.12 a.m. ..	7.12 a.m. (23rd)
Thursday, July 23 ..	Beechworth	11 a.m. ..	9.50 a.m. ..	12.51 p.m.
Thursday, July 23 ..	Everton ..	2 p.m. ..	1.11 p.m. ..	3.30 p.m.
Friday, July 24 ..	Euroa ..	10 a.m. ..	6.33 p.m. (23rd)	11.10 a.m.
Friday, July 24 ..	Seymour ..	1 p.m. ..	12.8 p.m. ..	4.58 p.m.

STALLION PARADES, TIME TABLE—*continued.*

No. and Date.	Parade.	Time.	Officer Arrives.	Officer Departs.
No. 16.				
Monday, July 20 ..	Dookie (Railway Station)	12.45 p.m.	12.45 p.m. ..	1 p.m.
Monday, July 20 ..	Katamatite (Railway Station)	2.5 p.m. ..	2.5 p.m. ..	2.50 p.m.
Tuesday, July 21 ..	Nagambie (Railway Station)	9 a.m. ..	7 p.m. (20th) ..	10.5 a.m.
Tuesday, July 21 ..	Shepparton ..	2 p.m. ..	11.20 a.m. ..	8.45 p.m.
Wednesday, July 22	Numurkah ..	11 a.m. ..	9.47 p.m. (21st)	12.24 p.m.
Wednesday, July 22	Strathmerton	12.47 p.m.	12.47 p.m. ..	1 p.m.
Wednesday, July 22	Cobram ..	2 p.m. ..	1.40 p.m. ..	3.20 p.m.
Thursday, July 23 ..	Nathalia ..	2 p.m. ..	1.32 p.m. ..	3.26 p.m.
Friday, July 24 ..	Murchison ..	10 a.m. ..	6.42 p.m. (23rd)	10.45 a.m.
Friday, July 24 ..	Rushworth ..	11.48 a.m.	11.48 a.m. ..	12.25 p.m.
Friday, July 24 ..	Colbinabbin	1.30 p.m. ..	1.20 p.m.	2.30 p.m.
No. 17.				
Monday, July 27 ..	Heathcote ..	2 p.m. ..	10.30 a.m. ..	6.23 p.m.
Tuesday, July 28 ..	Alexandra ..	2 p.m. ..	12.33 p.m. ..	4.5 p.m.
Wednesday, July 29 ..	Yea ..	9.30 a.m. ..	6.25 p.m. (28th)	10.30 a.m.
Wednesday, July 29 ..	Mansfield ..	2 p.m. ..	1.40 p.m. ..	3.30 p.m.
Thursday, July 30 ..	Kilmore ..	9 a.m. ..	8.30 a.m. (driving)	9.40 a.m.
No. 18.				
Tuesday, July 28 ..	Casterton ..	11 a.m. ..	7.40 p.m. (27th)	Driving
Tuesday, July 28 ..	Coleraine ..	3 p.m. ..	Driving ..	Driving
Wednesday, July 29	Edenhope ..	12 noon ..	Driving ..	Driving
Wednesday, July 29	Harrow ..	2 p.m. ..	Driving ..	Driving
Wednesday, July 29	Balmoral ..	3 p.m. ..	Driving ..	Driving
No. 19.				
Tuesday, July 28 ..	Dartmoor ..	11 a.m. ..	9 p.m. (27th) ..	9.55 a.m. (29th)
Wednesday, July 29	Heywood ..	11.45 a.m.	11.45 a.m. ..	12.15 p.m.
Wednesday, July 29	Portland ..	1.30 p.m. ..	1.5 p.m. ..	8.30 a.m. (30th)
Thursday, July 30 ..	Branxholme	10.55 a.m.	10.55 a.m. ..	11.15 a.m.
Thursday, July 30 ..	Dunkeld ..	1.30 p.m. ..	1.30 p.m. ..	3.53 p.m.
Thursday, July 30 ..	Hamilton (Police Station)	4.33 p.m. ..	4.33 p.m. ..	Driving (31st)
Friday, July 31 ..	Cavendish ..	10 a.m. ..	Driving ..	Driving
No. 20.				
Monday, August 3 ..	Dean's Marsh	11.35 a.m.	11.30 a.m. ..	2.40 p.m.
Monday, August 3 ..	Birregurra ..	3.5 p.m. ..	3.5 p.m. ..	7.55 p.m.
Tuesday, August 4 ..	Colac ..	10 a.m. ..	8.21 p.m. (3rd)	10.55 a.m.
Tuesday, August 4 ..	Gellibrand (Railway Station)	12.18 p.m.	12.18 p.m. ..	Continues journey by same train
Tuesday, August 4 ..	Beech Forest	2.10 p.m. ..	2.10 p.m. ..	2.45 p.m.
Wednesday, August 5	Winchelsea ..	10 a.m. ..	7.50 p.m. (4th)	11.13 a.m.
Thursday, August 6 ..	Lara ..	12.20 p.m.	12.20 p.m. ..	12.43 p.m.

STALLION PARADES, TIME TABLE—*continued.*

No. and Date.	Parade.	Time.	Officer Arrives.	Officer Departs.
No. 21.				
Monday, August 3 ..	Port Fairy ..	4 p.m. ..	2.50 p.m. ..	6 a.m. (4th)
Tuesday, August 4 ..	Koroit ..	11 a.m. ..	6.36 a.m. ..	Driving
Tuesday, August 4 ..	Hawkesdale	2 p.m. ..	Driving ..	3.27 p.m.
Tuesday, August 4 ..	Penshurst ..	4.11 p.m. ..	4.11 p.m. ..	7.32 a.m. (5th)
Wednesday, August 5	Warrnambool (Railway Station)	10.15 a.m.	10.15 a.m. ..	10.55 a.m.
Wednesday, August 5	Terang ..	12.30 p.m.	12.5 p.m. ..	1.10 p.m.
Wednesday, August 5	Mortlake ..	1.45 p.m. ..	1.45 p.m. ..	Driving
Thursday, August 6	Camperdown	11 a.m. ..	5.35 p.m. (5th)	12 noon
Thursday, August 6	Timboon ..	1.45 p.m. ..	1.45 p.m. ..	2.55 p.m.
Thursday, August 6	Cobden ..	4.5 p.m. ..	4.5 p.m. ..	Driving
Friday, August 7 ..	Werribee ..	11.47 a.m.	11.47 a.m. ..	1.16 p.m.
No. 22.				
Monday, August 3 ..	Drysdale ..	11 a.m. ..	9.30 a.m. ..	4 p.m.
Tuesday, August 4 ..	Meredith ..	10 a.m. ..	9.42 a.m. ..	11.13 a.m.
Tuesday, August 4 ..	Bannockburn	2 p.m. ..	11.38 a.m. ..	4.23 p.m.
Wednesday, August 5	Lismore ..	12 noon ..	11.49 a.m. ..	Driving
Wednesday, August 5	Vite Vite ..	2 p.m. ..	Driving ..	4.43 p.m.
Thursday, August 6	Cressy ..	10.30 a.m.	6.11 p.m. (5th)	10.59 a.m.
Thursday, August 6	Westmere ..	2 p.m. ..	1.13 p.m. ..	3.58 p.m.
Friday, August 7 ..	Inverleigh ..	10 a.m. ..	9.40 a.m. ..	Driving
Friday, August 7 ..	Geelong ..	2 p.m. ..	12.10 p.m. ..	5.30 p.m.
No. 23.				
Monday, August 10 ..	Royal Show Grounds	2 p.m.		
Tuesday, August 11 ..	Royal Show Grounds	10 a.m.		
No. 24.				
Monday, August 17 ..	Daylesford ..	Noon ..	11.55 a.m. ..	2.25 p.m.
Tuesday, August 18 ..	Waubra ..	10 a.m. ..	Driving ..	Driving
Tuesday, August 18 ..	Linton ..	2 p.m. ..	Driving ..	Driving
Tuesday, August 18 ..	Skipton ..	3 p.m. ..	Driving ..	Driving
Wednesday, August 19	Clunes ..	11 a.m. ..	8.36 a.m. ..	1.40 p.m.
Wednesday, August 19	Creswick ..	2.30 p.m. ..	2.13 p.m. ..	Driving
Wednesday, August 19	Kingston ..	3.30 p.m. ..	Driving ..	6.13 p.m.
Thursday, August 20..	Kyneton ..	10 a.m. ..	9.10 a.m. ..	Driving
Thursday, August 20..	Redesdale ..	2 p.m. ..	Driving ..	Driving
No. 25.				
Monday, August 17 ..	Morwell (Railway Station)	11.57 a.m.	11.57 a.m. ..	12.10 p.m.
Monday, August 17 ..	North Mirboo	3 p.m. ..	1.50 p.m. ..	4.25 p.m.
Tuesday, August 18..	Traralgon ..	10 a.m. ..	9.2 p.m. (17th)	12.20 p.m.
Tuesday, August 18 ..	Sale ..	2 p.m. ..	1.26 p.m. ..	6.20 a.m. (19th)
Wednesday, August 19	Maffra ..	9 a.m. ..	7.14 a.m. ..	10.50 a.m.
Wednesday, August 19	Cowwarr ..	2 p.m. ..	12.25 p.m. ..	4.55 p.m.
Thursday, August 20	Trafalgar ..	10 a.m. ..	6.51 p.m. (19th)	11.16 a.m.
Thursday, August 20..	Moe ..	Noon ..	11.26 a.m. ..	6.39 p.m.
No. 26.				
Monday, August 24..	Beaufort ..	2 p.m. ..	12.35 p.m. ..	6.37 p.m.
Tuesday, August 25..	Willaura ..	10 a.m. ..	8.15 a.m. ..	2.19 p.m.
Tuesday, August 25 ..	Maroona ..	2.38 p.m. ..	2.38 p.m. ..	2.45 p.m.
Wednesday, August 26	Nhill ..	3 p.m. ..	1.30 a.m. ..	1.32 a.m. (27th)

STALLION PARADES, TIME TABLE—*continued.*

No. and Date.	Parade.	Time.	Officer Arrives.	Officer Departs.
No. 27.				
Monday, August 17 ..	Warragul ..	10.12 a.m.	10.12 a.m. ..	11.5 a.m.
Monday, August 17 ..	Neerim South	3 p.m. ..	12.20 p.m. ..	5.25 p.m.
Tuesday, August 18 ..	Bunyip ..	10 a.m. ..	9.38 a.m. ..	11.25 a.m.
Tuesday, August 18 ..	Pakenham ..	12 noon ..	11.54 a.m. ..	Driving
Tuesday, August 18 ..	Berwick ..	3 p.m. ..	Driving ..	9.19 p.m.
Wednesday, August 19	Cranbourne..	11 a.m. ..	8 a.m. ..	5.57 p.m.
Thursday, August 20	Woolamai ..	9.30 a.m...	8.5 p.m. (19th)	10.8 a.m.
Thursday, August 20	Wonthaggi ..	2 p.m. ..	10.55 a.m. ..	3.45 p.m.
Friday, August 21 ..	Lang Lang ..	9.15 a.m...	6.18 p.m. (20th)	9.51 a.m.
Friday, August 21 ..	Dandenong..	11.30 a.m.	11.16 a.m. ..	12.28 p.m.
No. 28.				
Monday, August 24 ..	Korumburra	10.30 a.m.	10.27 a.m. ..	Driving
Monday, August 24 ..	Leongatha ..	2.30 p.m...	Driving ..	11.12 a.m. (25th
Tuesday, August 25 ..	Yarram ..	3.30 p.m...	2.15 p.m. ..	7 a.m. (26th)
Wednesday, August 26	Welshpool ..	10 a.m. ..	7.35 a.m. ..	Driving (26th)
Wednesday, August 26	Foster Railway Station	12 Noon ..	12 Noon	Driving
Wednesday, August 26	Stony Creek	2 p.m. ..	2 p.m. ..	Driving
No. 29.				
Tuesday, August 25 ..	Mernda ..	11 a.m. ..	10.42 a.m. ..	1.34 p.m.
Tuesday, August 25 ..	Whittlesea ..	2.30 p.m...	1.50 p.m. ..	7.45 p.m.
Wednesday, August 26	Lilydale ..	2 p.m. ..	1.43 p.m. ..	5.8 p.m.
Thursday, August 27	Romsey ..	11 a.m. ..	10.40 a.m. ..	Driving
Friday, August 28 ..	Ballarat Show Grounds	12 Noon ..	11.8 a.m. ..	3 p.m.
No. 30.				
Monday, August 31 ..	Dromana ..	1.30 p.m...	1 p.m. ..	2 p.m.
Tuesday, September 1	Cowes ..	1 p.m.		
Wednesday, Sept. 2 ..	Stony Point	11 a.m. ..	11 a.m. ..	11.40 a.m.
Wednesday, Sept. 2 ..	Frankston ..	2 p.m. ..	12.37 p.m. ..	3.42 p.m.
No. 31.				
Tuesday, September 1	Orbost ..	10 a.m. ..	6.50 p.m.(31st)..	10.35 a.m. (2nd)
Wednesday, Sept. 2 ..	Nowa Nowa	11.40 a.m.	11.40 a.m. ..	Driving
Wednesday, Sept. 2 ..	Buchan ..	1 p.m. ..	Driving ..	Driving
Thursday, September 3	Bairnsdale ..	Noon ..	11.30 a.m. ..	Driving
Thursday, September 3	Lindenow ..	2.30 p.m.	Driving ..	3 p.m.
No. 32.				
Tuesday, September 1	Ensay South	11 a.m.	11 a.m.	11.10 a.m.
Tuesday, September 1	Omeo ..	3 p.m. ..	3 p.m. ..	6.25 a.m. (2nd)
Wednesday, September 2	Bruthen ..	12.25 p.m.	12.25 p.m. ..	12.40 p.m. (2nd)
No. 33.				
Wednesday, September 9	Sunbury ..	11 a.m. ..	7.41 a.m. ..	2.56 p.m.
No. 34.	French Island			
Wednesday, September 16	Royal Show	1.30 p.m.		
Thursday, September 17	Royal Show	9 a.m.		

THE BETTER BULL.

What District Herd Test Association Records Reveal.

By W. J. Yuill, Dairy Supervisor.

A well-worn phrase in connexion with dairy husbandry has it that the "bull is half the herd," and some farmers go as far as to say that the use of a certain sire has been the turning point to success in their experience. So strongly has the necessity for a good bull been stressed that its general application in practice might reasonably have been expected. However, the fact cannot be denied that such is not the case when production of milk and butter-fat is the objective.

Many owners of grade herds, and even breeders of pure stock, appear to receive the advice with anything but confidence. This is so, despite the fact that they purchase bulls to increase or decrease the size, change the colour, or alter the conformation of the progeny, according to their wish.

At times, bulls showing Shorthorn or Red Poll breeding are mated with grade herds for no other reason than to secure calves with increased size and colours acceptable to the dealer or grazier. On the other hand, a Jersey bull is often mated with a heifer of another breed so that a small calf may be born at the first calving. In both instances the belief that "the bull is half the herd" is to some extent recognized. Men who deny the ability of a sire to transmit to his progeny the function of production will expect the elimination of some undesirable feature, such as an "uneven topline," a "drooping rump," or "undershot jaw," or some other such weakness. Among the rank and file of dairy-farmers there are men who consider that breeding for production is a matter of chance, and that the probable results to be expected from mating pure-bred animals is improbable in the case of grade or "scrub" herds. In other words, they consider chance to be a greater factor than control, and that the science of breeding is built on some sort of a hit-or-miss principle.

Too often it is forgotten that the breeders have not changed the bovine nature, and that the various breed characteristics are distinctly the result of the breeder's art. The influences that have brought about changes in colour and conformation might reasonably be expected to increase or retard the development of any particular function, and also the power of transmitting this quality from one animal to another, provided that the function is a dominant characteristic.

Some wonderful records of production have been made by pure-bred cows here and in other parts of the world. Many of these great producers appear in certain families and groups, their greatness being traceable to the predominating influence of some particular sire or line of blood. In general, it may be said that the statement is accepted by all but the sceptical or antagonistic; but of the many who accept it, it must be admitted that they do so only in a casual or superficial way. The results claimed are assigned to some magical or undefined influence, rather than to the real cause, that of dominance in the function of production.

EFFECT OF THE DISTRICT HERD TEST ASSOCIATION MOVEMENT.

The Quality Pure-bred Bull.

With the certain information supplied by the Herd Test Association records, much of this nebulous thought and even scepticism has been dispelled, and Association members are realizing the value of the "test-bred" herd sire. One of the outstanding features of the movement is the activity of members in the matter of securing such bulls, for available information shows clearly that in almost every instance the leading herds are owned by dairymen who have been using "record-bred" bulls, paid for in proportion to the production of their dams.

It cannot be too strongly stressed that, while many bulls beget successful milkers, but few beget excellent ones, and, further, that excellence is unconditional, in that the really first-class milker succeeds where others treated in a precisely similar manner will fail.

The prominence given to the subject of the "herd sire" in the leading dairying countries should impress its importance upon dairy-farmers in this State. In Denmark there are 800 bull clubs, owning approximately 1,000 proved sires. In some instances legislation has been framed to bring about the elimination of the "mongrel" bull. *Hoard's Dairyman* tells of a public funeral being given to the last "scrub" bull in one of the States. To this class of bull, and to indifferent feeding, can safely be attributed the low average production per cow in Victoria.

This *Journal* has been used extensively to demonstrate the value of the "herd sire," a value proved by the overwhelming information deduced from the operation of the standard test records. As might have been expected, similar results accrue from the available information of the District Herd Test Association movement. The writer has seen grade bulls, showing good dairy type (usually a legacy from some pure-bred parent). In not one instance can it be recorded that this virtue was claimed for the "scrub" ancestry.

Calves from the first cross between any two of the dairy breeds will often develop into very fine dairy cows, but the next step away from pure blood shows lessened production approaching the "nondescript" cow, whose average production is approximately 3,000 lb. of milk and 120 lb. of butter-fat.

Pedigrees are considered by many to have a fictitious value, but, at the least, each is a record of information or history of the progenitors of a particular animal. They increase in value when the production records of the dams are available. A pedigreed bull has behind him a "scrap of paper" containing a history of his parentage. The "scrub" bull has nothing behind him but an unknown ancestry—"and his tail." The best that can be hoped for is that his progeny will be no worse than he himself is.

"Scrub" and grade bulls are fast disappearing from the herds of Herd Testing Association members, for there is a feeling abroad that it is a slur on one's intelligence to own a bull whose very appearance is an index to his pedigree and his breeding. The "red and white"

or "roan brindle" furnishes an apt illustration of this type of bull, which is an effective brake on the energies of his owner, a menace to neighbouring breeders of pure stock, and a curse to the industry.

Attention to Feeding Needed.

Rational feeding is now receiving serious consideration, and increasing areas are being devoted to green fodder. Practical men express surprise at the amount of feeding that their herds will consume over and above what was considered sufficient hitherto. Feeding must at all times remain the fundamental principle of success in dairy farming, for it matters not whether it be Melba 15th of Darbalara, the world's champion producer, or the poorest grade or "scrub" cow, be she black, white, brown, red, or brindle; the maximum production of each is entirely dependent on the feeding supplied. Herd-testing work has impressed on members the fact that the yield of the heaviest producers suffers to the greatest extent from any shortage of feeding. Further, that under identical conditions the progeny of some bulls will excel to the extent of from 50 to 100 lb. of butter-fat during a lactation period.

Some Interesting South Gippsland Records.

During the first test year of the Mirboo District Herd Testing Association, Mrs. Agnes Smith and Sons, of Allambee, observed that the eight daughters of "Nobel," a "Lucy Noble" bred bull, averaged 79 lb. more butter-fat than the twelve daughters of another pure-bred bull in the herd. The cows were of similar ages, and were milked under identical conditions, yet the progeny of the first-named bull all produced over 300 lb. of butter-fat, while none of the progeny of the latter bull reached 300 lb., their average production being 242 lb.

Messrs. G. and E. Smith, of Mirboo North, owe the present high average production of their herd to the predominating influence of "Renard's Pride," ex "Lotina's Lady" by "Lotina's Larkspur's Twylish," his sire being "Starbright Renard" by the imported bull "Carnation Fox." Nearly half of the herd are by this bull, and under five years, yet the average production of the herd for 1924, taken from the District Association Register, was 304 lb. of butter-fat. During the two years that the herd has been under test, heifers by "Renard's Pride" have averaged as under:—

		Milk.	Per cent.	Butter-fat. lbs.
(10)	2 years old	4,174	5.1	225
(4)	3 years old	4,574	5.4	265
(3)	4 years old	6,650	5.4	359

A son of "Tiddlewinks II.," of Holmswood, is now in use. "Tiddlewinks II." produced 10,850 lb. of milk, testing 5.32 per cent., and 576.91 of butter-fat in 1919 under standard test conditions.

Another instance of the outstanding influence of a "test-bred" bull is seen in herd test records of Mr. James Nuttall and of Mr. Thos. Collins, of Yinnar. For three years in succession Mr. Collins' herd has occupied second place in the Yinnar District Association, while

Mr. Nuttall's herd has occupied the leading place for the past two years. The high production of these two herds is to a large extent due to the progeny of an unregistered Jersey bull, known as "Sir William," by a bull bred by Mr. Felingham, of Fernvale, and out of a "Melrose" cow. In Mr. Collins' herd seven cows by this bull produced, during last year, as under:—

Name.	Age.	Milk.	%	Butter Fat.
Spot	6 ..	10·790 ..	4·52 =	489·47
Nancy	5 ..	9·309 ..	4·63 =	431·05
Bonnie	6 ..	10·259 ..	4·18 =	428·69
Paddy	6 ..	8·415 ..	4·77 =	405·50
Banley	6 ..	7·976½ ..	4·93 =	397·27
Tulip	6 ..	8·081 ..	4·04 =	327·00
Dinah	6 ..	10·326 ..	3·07 =	317·00

In Mr. J. Nuttall's herd "Sir William" cows have produced as under:—

Name.	Age.	Milk.	%	Butter Fat.
Jinnie	8 ..	10,926 ..	5·05 =	551·00
Ida	8 ..	11,102 ..	4·06 =	451·00
Ruby	9 ..	9,313 ..	4·69 =	429·00
Pet	6 ..	8,540 ..	4·87 =	416·00
Gip	8 ..	7,342 ..	4·4 =	360·50
Dumpy	6 ..	8,385 ..	4·1 =	343·00
Tiny	6 ..	6,629 ..	5·18 =	343·00
Niggar	6 ..	7,041 ..	4·6 =	335·00
Ada	8 ..	7,342 ..	4·4 =	285·00
Fairy	4 ..	6,715 ..	4·24 =	285·00

Mary, a five-year-old cow, bred from a "Sir William" cow and by a son of "Sir William," produced on a balanced ration, during last year (when she was third best cow in the Association), 11,298 lb. milk, testing 4.47 and 503.18 lb. butter-fat. The progress made in these two herds in the course of two years is shown in the table produced hereunder:—

Year.	No. of Cows.	Milk.	Test.	Butter Fat.
		lb.	%	lb.
Mr. Jas. Nuttall's Herd.				
1921–22	47	5,342	4·56	243½
1922–23	41	7,136	4·33	308
1923–24	42	8,220	4·44	365½
Mr. Thos. Collins' Herd.				
1921–22	..	5,727	4·30	245
1922–23	23	6,343	4·63	296
1923–24	26	7,439	4·80	359

In the steep-hill country at Allambee, Mr. T. W. Clark is showing what well-managed Ayrshires can do. During the past two years, the two-year-old heifers of "Illustrious," of Gowrie Park, ex "Ida," of Gowrie

Park (605 lb. of butter-fat), by "Wallace," of Gowrie Park, have averaged 200 lb. of butter-fat, while a three-year-old produced 321 lb., and followed up this performance with 397 lb. as a mature cow.

The writer has had extensive opportunities to observe the difference in production between good hill country and good creek and river flats. The difference would appear to be at least 50 lb. of butter-fat per cow, in favour of flats.

Splendid results have attended the introduction of "Graceful Lad of Lesterfield," into the herd of Messrs. J. Walker and Sons at Middle Creek, Yinnar South. "Graceful Lad" is from "Graceful Duchess XI.," of Melrose, by "Mystery's Son of Melrose." His sire was "Magnet's Maitland." "Graceful Duchess" is a high-testing heavy producer, having a record of 8.314 lb. of milk, with a test of 6.47 and 538 lb. butter-fat. The progeny of "Graceful Lad," with one exception, have an increased test over that of their dams, together with a heavy milk yield for two-year-old Jersey heifers.

Records of Two-year-old Heifers by "Graceful Lad of Lesterfield."

Herd No.	Milk.	Test.	Butter Fat.
	lb.	%	lb.
8	4,454	6·66	297
10	5,387	5·47	295
51	5,167	5·68	294
23	6,059	4·55	288
45	5,072	5·60	284
64	4,937	6·09	280
47	5,177	5·45	279
40	5,174	5·10	264
5	3,928	5·74	225
35	3,812	5·89	224
34	4,291	4·85	208

Records of Dams, mostly by Jessima's "Twylish of Kingsvale" and "Gay Fox."

Herd No.	Milk.	Test.	Butter Fat.
	lb.	%	lb.
42	5,342	6·4	342
21	6,282	5·9	374
36	5,880	5·1	300
48	No record		
7	7,208	4·8	346
4	6,271	5·9	370
94	6,431	5·1	328
62	6,681½	4·56	304½
31	6,272	5·5	345
95	6,594	4·7	311
81	No record		

Records of Some Members of the Herd of Mr. Lance Lewis, Yinnar.

Year.	1. Record of Dams.			2. Record of Daughters of Dams in (1) by sires other than "Charmer of Warenda."			3. Record of two-year-old heifers by "Charmer of Warenda."		
	Milk.	Test.	Butter Fat.	Milk.	Test.	Butter Fat.	Milk.	Test.	Butter Fat.
	lb.	%	lb.	lb.	%	lb.	lb.	%	lb.
	Mayflower.			*Lady ex Mayflower.*			*May ex Mayflower by Charmer.*		
1921–22 ..	7,674	3·78	289	5,159	3·56	185	..	..	..
1922–23 ..	7,381	3·76	278	..	..	..	..	..	..
1923–34 ..	8,125	3·69	300	8,242	3·6	300	6,365½	4·32	275½
	Peggy.						*Topsy, a junior two-year old, ex Peggy by Charmer.*		
1921–22 ..	7,135	4·10	292	None under Test			..	..	..
1922–23 ..	8,043	4·06	327				..	..	..
1923–24 ..	8,495	4·13	351				4,201½	4·98	210
	Rose.			*Flower ex Rose.*			*Rose II. ex Rose by Charmer.*		
1921–22 ..	No record			5,591	4·18	234	..	..	..
1922–23 ..				7,271	3·93	285	..	..	..
1923–24 ..				7,557	3·99	301½	5,328½	5·32	284
	Benn.			*Podge ex Benn.*			*Benn II. ex Benn by Charmer.*		
1921–22 ..	5,771	4·36	252	5,778	3·6	208	..	..	..
1922–23 ..	..	..	..	7,342	3·5	257	..	..	..
1923–24 ..	..	..	..	7,725	3·6	274	4,297	5·67	244

Test work shows "Charmer" to be a prepotent sire. His first four daughters, as two-year-olds, show an increase of 50 lb. butter-fat over their respective half-sisters at the corresponding ages under similar treatment.

In 1921, the unculled herd of Mr. Lance Lewis, of Yinnar, averaged 5,356 lb. of milk and 219 lb. of butter-fat. After three years' test work, the culled herd of a similar number (the herd having been built up with two-year-old heifers) averaged 6,359 lb. of milk and 282 lb. of butter-fat. The production of these heifers, by "Charmer," of Warenda, is given on page 310; also that of their dams and half-sisters by other sires. "Charmer" is out of "La Charm," a "Skim of Dunalister" cow, his sire being "Carrier 5th Noble," who also sired "Agnes," of Warenda, the champion heifer of all breeds, her production being 8,307 lb. of milk with a test of 6.33 and 527 lb. of butter-fat. Through his sire, "Charmer" is a grandson of the famous "Pretty Noble" imported.

History repeats itself wherever evidence is sought of the results from "test-bred" pure stock, provided that such stock be in the hands of an intelligent dairyman. "Pure-bred" and "pedigree" are by no means synonyms for "production capacity," for in all the breeds there are "scrub" cattle as far as production is concerned. It is often claimed for the mongrel bull that his progeny will exist where the pure-bred animal will perish. Since argument of this kind is not applicable to rational dairying (which demands that every cow shall receive sufficient feeding at all times) it needs no refutation.

An instance of considerable value and interest, given by Mr. F. McIvor, of Tarwin Lower, goes to disprove this belief. Consequent on the record drought, bleak winter and late spring, feed was scarce at Tarwin during 1923-24, and this condition was aggravated by high salt tides. As a consequence, the production of the herd was seriously depreciated. Yet a perusal of the figures below will show that the progeny of the "scrub" bull failed to hold their own in an environment where, according to the theory just mentioned, they should have revelled. In this connexion, the records of the daughters of two half-sisters "Glory" and "Jewel" with the record of another are interesting. Both "Glory" and "Jewel" were graded Ayrshire cows of good type, and were proved producers, the former being the better of the two, and the winner of a 24-hour butter-fat test at Swan Hill with 54 lb. of milk, testing 4.6 and 2.46 lb. of butter-fat for the period. The records are as follow:—

"Scarlet," two year, ex "Glory," by "scrub" bull—125 lb. butter-fat.

"Jewel II.," two year, ex "Jewel," by "White Cloud," of Gleneira—198 lb. butter-fat.

"Lady Jean," two year, ex "Lady Jean," of Glenira, by "W. Cloud"—207 lb. butter-fat.

Both the pure-bred and the grade heifer by "White Cloud" greatly surpass in production the "scrub" bull's daughter, which was bred from the better cow. "White Cloud's" progeny do justice to their breeding under adverse circumstances, while "Scarlet" is typical of many animals by nondescript bulls, whose only strong characteristic is the perpetuation of their undesirable qualities.

The Mongrel Bull must be Got Rid Of.

The "scrub" bull is transmitting to future generations "mongrelism" and a capacity for only low production, factors of as great detriment to the dairying industry as is sidebone, curb, or spavin to the horse-breeding industry. If in order to guard against unsound sires perpetuating their faults, stallions must be certificated as to soundness, surely there must be equal need of legislation to effect the elimination of the "scrub" bull, a potent source of national loss.

Breed type, and ability to withstand hardship can never be of equal importance to production when practical dairy farming is considered. Of course, both breed type and hardiness have their place; the former can safely be left in the hands of the pure-bred studmaster, the latter to the cattle on out-back stations. To the dairy-farmer who is seeking to increase the production of his herd—whether it be gallons of milk or pounds of butter-fat, or both—the advice of the Department of Agriculture is to secure a "test-bred" pure bull. The more production that there is showing in the records of his dam and granddam, and the dam of his sire, the surer will be the improvement in the production of his progeny.

This also is the advice of the dairymen who have proved the wisdom of investing in a good sire. The evidence of the District Herd Testing Association records proves conclusively that some system of milk recording and testing for the butter-fat content is essential to progress; otherwise, a complete knowledge of the value of the bull and of each individual cow is impossible.

It is also well to remember that "prepotency" in the scrub bull can nullify the best of farming methods, for no cow can produce above the maximum production that has been bred into her.

Insufficient feeding may seriously limit the producing ability of any cow or herd, but no system of feeding will make an animal—physically incapable—secrete milk and butter-fat above that of her natural maximum capacity. It is safe to assert that much time and labour is being spent on this kind of cow by dairymen who are undoubtedly capable farmers otherwise. The natural inferiority of the cow can be traced to only one source—that of her breeding.

In this respect, overwhelming evidence proves that the bull can be a tremendous factor for good or ill, and undoubtedly the most hopeful signs at the present time are the keenness of dairymen to secure a "test-bred" pure bull and the rapid increase in the formation of District Herd Testing Associations. With the certain knowledge of the sire and dams, together with better feeding methods, a steady improvement in the average production must follow, to the advantage of the owner, his district, and the industry.

THE KHAKI CAMPBELL DUCK.

The Utility Duck.

For many years past poultry breeders have considered that as egg producers fowls are much better than ducks. The well-known laying records of the White Leghorns and Black Orpingtons have largely contributed to this belief, even though the scores made by the Indian Runner ducks challenged it. The poultry-keeper of to-day, however, who, while taking a great interest in his own flock, endeavours to learn what is going on elsewhere has now, owing to the introduction of new breeds and strains, every reason to revise his judgment, and even to reverse it.

As is natural at first, this change in opinion was only occasionally mentioned in a journal, but now it is generally accepted and definitely stated in the latest text-books. Thus we find Mr. E. T. Brown, the well-known English authority, in *The Poultry Keepers Text-book,* published last year, writing:—"Some of the more modern breed of ducks are remarkable layers. During a 44 weeks' laying trial, it was proved that ducks may be better layers than the best strain of pullets, as the following figures show." He then proceeds to give a list of thirteen competitive pens (five birds in each pen), in which three varieties of ducks, viz., Khaki Campbells, Coaley Fawns, and Fawn and White Runners easily beat the White Leghorns and White Wyandottes, the Khaki Campbells heading the list, and laying 145 more than the White Leghorns, and 153 more than the White Wyandottes. For many years the need of a utility duck which would correspond with the Black Orpington, both as an egg layer and table bird, was noted by many English breeders, and it is due to one—Mrs. Campbell, wife of Dr. Campbell, Yorkshire—that such a breed has been produced after experimenting for over twenty years. At first, she opposed the idea of exhibiting them on the ground that as the birds were not bred for exhibition, but for utility purposes, it was unfair to them.

However, in 1920 and 1921, they were entered at the National Laying Test, Bentley, England, and finished easily first, being ahead of all the pullets and all other ducks. This at once brought them into prominence, and in 1921-1922, at the same test, a pen of Khaki Campbells won five of the first seven places. In 1922-1923, at the same test, 160 Khaki Campbells averaged 223 eggs, while 220 Indian Runners averaged 184 eggs, and 48 other breeds averaged 175 eggs, and at the Olympia Show a Khaki Campbell carried off the International trophy. Last year (1924) a Khaki Campbell duck won the individual test, and a pen of five ducks of this breed laid the largest number of eggs, but as some were under the 2-oz. standard the prize went to a pen of Indian Runners. It is records like these which, however, are not all that can be quoted on their behalf, that have led to the boom of these ducks in England, and a writer in *The Feathered World Year-book,* 1924, to state:—"This variety has leaped into fame mainly through their heavy-laying qualities, but with these they have produced distinctive colour and marking, which makes them attractive and pleasing to the eye. If kept and bred on the present lines, they will do for the egg producer

and show-pen, besides making a useful table bird, hence a breed which must maintain its hold upon those who talk so much about dual purposes." In the same annual (page 273), Mr. Harold Paine, the well-known duck authority, states in an article on the feeding of ducks for egg production, that "a pen of five Khaki Campbells recently produced 1,651 eggs in twelve months, being an average of 330 eggs per bird. The ducks had good grass runs, and the only water available was that given in large bowls or crocks." This leads one to remark that if Khaki Campbells are kept for egg production, they do not need swimming water, though it is desirable for breeding.

They begin to lay when about four and a half to five months, and a notable feature about them is the autumn production of eggs which may often be as prolific as in the spring. There is little, if any, falling

A Khaki Campbell Drake.

off in their yearly output of eggs up to three, and even four, years of age. The eggs have a delicate flavour. Another advantage that they have is that they eat less than the Indian Runners. Oscar Brown, B.Sc. Agriculture, honorary secretary of the Khaki Campbell Club, writes:—"Year by year I have been impressed by their performances, especially since the weekly wages bill became so serious on the general farm. They are now a brilliant lining to the intensely black agricultural cloud, and I can confidently recommend them to everybody, especially farmers. Most of my Khaki Campbells have been kept for the past fourteen years on the open-air system, sleeping out of doors in simple wire enclosures, even in midwinter." He further states that he has now (1924) three Khaki Campbell ducks more than seven years old this spring, now in their sixth laying season, mated for the fifth consecutive year up to the same drake, and adds:—"These three ducks are

the best I have ever possessed, and their autumn production, sleeping out of doors, has been most remarkable, especially in the second, fourth, and fifth season.

Being very active birds, and extremely hardy, owing to their wild duck ancestry, they are excellent foragers. and for that reason extremely useful in orchards, where they are not injurious, as fowls sometimes are. Also, because of their wild duck ancestry, the quality of their flesh is excellent, and young drakes can be made to reach the weight of 4 lb. at twelve weeks, and 5½ to 6 lb. when fully grown. Viewing them all around, they may well claim the title of utility birds, if we accept Powell-Owen's definition: "It is not abnormal individual egg records gained at the expense of stamina, but high flock averages combined with beauty, breed, type, and vigour, which constitute true utility." Further, they have justified Joseph Pettifer's statement in *The Feathered World Year-book*, 1923:—"They are the premier layers of the feathered tribe; premier in two ways—first, because their performances have officially proved that they are capable of laying more eggs in a given time than any other breed of duck or hen, and second, because they do so at a minimum of cost."

An Indian Runner was the basis of the original Campbell ducks. Then various matings were made with the wild duck, to give it greater hardiness and delicacy of flavour, while better table value was obtained with the help of the Rouen. Later, the Coaley Fawn was also introduced, and now, to quote Mr. Joseph Pettifer, the well-known English authority, "the finished product is a most prolific layer, an excellent forager, and a good table bird."

Khaki Campbells are handsome birds of a khaki plumage, which is a distinct advantage, as the ducks do not look as dirty in muddy surroundings as white or light coloured birds. The drakes have the head, neck, stern, and wing bar bronze, and the rest of the body a khaki colour, while the ducks are of khaki colour, or else dark buff all over, with the back and wings laced with lighter shade.

They secured first prizes for both ducks and drakes in the "Any other variety" of the duck section at the last Victorian Poultry and Kennel Show, and were also prize winners at the Royal and Geelong shows.

In conclusion, a few remarks may be made in reference to duck eggs. The war has had a good deal to do with removing the prejudice against them, and this was largely because a duck egg has a food value of 100 calories as against 80 for a hen's, and every experienced cook knows that duck eggs are worth more than hen eggs, as they are larger, and go further, even though the white does not beat into froth. When ducks were kept in and around farm yards with free access to stagnant and dirty pools, and undesirable surroundings, the eggs undoubtedly had a strong flavour, but with ducks kept on modern lines in clean surroundings, the strong flavour is almost a thing of the past, and the prejudice against the eggs is becoming less.

The breed only wants to be as well known here as in England to secure the popularity it has reached in England. For the first time in Australia, they were exhibited at the Victorian Poultry Show last year by Dr. James Booth, of North Melbourne, whose two pairs of ducks and drakes were imported direct from Colin Campbell.

THE CLEANING OF MILKING MACHINES.

An article in the New Zealand *Journal of Agriculture* advocates a method of cleaning milking machines which does away with the scrapers and spiral hair-brushes that so damage the inner surfaces of the rubbers.

The following are essential to the method:—(1) A suitable plant for boiling water; (2) a stock of caustic soda; (3) an ample supply of clean water; (4) some scrubbing brushes, large buckets, a suitable bath or tub, and a ball of horsehair.

The procedure recommended is as follows:—

(1) Before milking draw cold water through all milk tubes and the releaser, so as to prevent the adhesion of milk to the pipes, &c.

(2) Immediately after milking wash all dirt off the outside of the teat-cups and rubbers; then draw through each set of teat-cups sufficient cold (or preferably lukewarm) water to flush out the milk system. When drawing the water through the set farthest from the releaser insert a ball of horsehair in the end of the milk pipe, to cause it to travel through to the releaser with the water.

(3) Next draw through each set of teat-cups not less than 1 gallon of boiling water to which caustic soda has been added at the rate of not less than 1 to 1½ tablespoons per 4 gallons of boiling water. Distribute the solution as evenly as possible through each set of teat-cups.

(4) Immediately follow by flushing out the caustic soda solution with 2 gallons of hot water or 1 gallon of boiling water for each set of teat-cups. The flushing with boiling water helps to dry the rubbers and leaves the milk system dry and sweet.

(5) Then remove or open the plug or flap from the releaser pipe to allow of free circulation of air.

(6) Next clean the vacuum system in the same manner as the milk system, by drawing through first the caustic-soda solution, and next the boiling water which has been circulated through the milk system. Pay particular attention to the cleaning of the pipe connecting the releaser to the vacuum tank by flooding the releaser to cause the water to travel through the vcauum tank. This is important.

(7) The engine can now be stopped. Disconnect the two long rubbers from downpipes and teat-cups, and hang in a clean airy place out of the sun.

(8) Next disconnect the releaser, wash, rinse, and place in a clean, dry, sunny place; then disconnect the top or bottom half of the vacuum tank and treat in a similar manner.

To ensure effective cleaning by this method it is essential that it be carried out daily in the manner directed.

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

Cultivation.

Cultivation work should be well on the way by this time. The ploughing should be advanced, so as to leave plenty of time for other orchard work. Autumn ploughing may be rough, but care should be taken to plough to the trees, so that a drainage furrow is left between the rows.

Manuring.

It is just possible, where heavy crops have been carried, that a top dressing of stable manure will be required to add humus to the soil. The fertility of the soil must be maintained; and, although stable and chemical manures as a general rule are of undoubted value as tree stimulants, well-cultivated and thoroughly tilled land will always carry fair crops with far less manure. Further, if the orchard land is well drained, cultivated, and sub-soiled, any manures that are used will be far more beneficial to the trees. The more suitable the conditions that are given to the trees, the better they can appreciate and assimilate their food.

Perhaps the most useful and valuable of manures is stable manure. It is of great use, not only as a manure and as an introducer of necessary bacteria into the soil, but its value in adding humus to the soil is incalculable. Organic matter, such as stable manure, introduced into the soil quickly becomes humus; this greatly ameliorates and improves soil conditions. It is impossible to say what quantity of stable manure is necessary per acre; that can be determined only by circumstances. Orchards in different climates and varying soils will require differing quantities. A too liberal use of stable manure will be over-stimulating in most cases, and at all times an excess beyond what is necessary for present use will only be waste, as humus is readily lost from the soil, once it is in an available food form.

It has been pointed out in these notes previously that an improved physical condition is far more profitable to the fruit-grower than the continued use of manures. A tree will be far more productive if it is happy in its soil conditions; uncomfortable conditions will always result in unprosperous trees.

A dressing of lime, using about 4 or 5 cwt. per acre, is of great value in stiff or heavy orchard lands; and it may be given at this season. The lime, which must be fresh, should be distributed in small heaps between the trees, covered with a layer of soil, and allowed to remain for a few days before ploughing or harrowing in.

PESTS.

The advice given last month for spraying should be followed, particularly where any oil emulsions or washes are to be used.

Orchards will benefit if an attack is now made upon the Codlin moth. All hiding places, nooks, and crannies, where the larvæ have hidden, should be thoroughly searched and cleaned out. The orchardist has far more time now to do this work than he will have in the spring time.

GENERAL WORK.

Drainage systems should now be extended with as little loss of time as possible.

New planting areas should be prepared, and sub-soiled or trenched wherever possible.

The Vegetable Garden.

Weeds must be kept down in the vegetable garden. Weeds are generally free growing at this season; their growth is very insidious, and they will crowd out the young seedlings or plants in a very quick time. Hoeing and hand weeding must be resorted to, preferably hoeing. The frequent use of the hoe in winter time is of much benefit in the vegetable garden. A varied assortment of crops is now being produced; and if these can be kept growing much better crops will result. The soil quickly stagnates in the winter, and the only way to prevent this is to keep the surface stirred. Thus, a double service is performed with the aid of the hoe.

The application of lime is of great necessity at this season. In addition to amending unhealthy and unsuitable soil conditions, lime is particularly useful as an insecticide. It assists in destroying in immense numbers both eggs and insects that would breed and live in the ground ready to do damage to all classes of vegetable crops. Therefore, wherever possible, the soil should receive an application of lime. The garden should, as well, be manured with stable manure, but not for some weeks after the lime application.

Cabbage and cauliflower plants may be planted out; and seeds of parsnips, carrots, onions, peas, and broad beans may be sown.

The Flower Garden.

beds should be cleaned up, top dressed with manure, and well dug. The light rubbish, such as foliage, twiggy growths, weeds, &c., may all be dug in, and they will thus form a useful addition to the soil. These should never be wasted. Only the coarser and stouter growths should be carted away for burning, and then the ashes may be used as manure. No part, whatever, of garden rubbish or litter need be wasted. In one form or another it should be replaced in the soil.

May is a good month for establishing new gardens, and for planting out. All deciduous plants and shrubs may now be planted. It is not necessary to dig a deep hole for planting. A hole in which the roots of the plant can be comfortably arranged, without crowding or cramping, will be quite sufficient for the purpose, the soil around being very well cultivated.

Continue to sow seeds of hardy annuals, including sweet peas, although the main crop of sweet peas should by this time be well above ground. Where there has been any overplanting, the young plants will readily stand transplanting, and this will greatly assist those that are to remain. Annuals should not be crowded in the beds. They require ample room for suitable development, and thus the seeds should be sown thinly or the plants set out a good distance from each other.

All herbaceous perennials that have finished blooming may now be cut down. Included amongst these are phlox, delphiniums, &c. If these are to remain in their present situation for another season it is always an advantage to raise them somewhat, by slightly lifting them with a fork, so that too much water will not settle around the crowns; they may also be mulched with stable manure, or the manure may be forked into the soil around the crowns.

REMINDERS FOR JUNE.

LIVE STOCK.

HORSES.—Those stabled and in regular work should be fed liberally. Those doing fast or heavy work should be clipped; if not wholly, then trace high. Those not rugged on coming into the stable at night should be wiped down and in half-an-hour's time rugged or covered with bags until the coat is dry. Old horses and weaned foals should be given crushed oats. Grass-fed working horses should be given hay or straw, if there is no old grass, to counteract the purging effects of the young growth. Old and badly-conditioned horses should be given some boiled barley. Paddocked horses should be looked at from time to time to ascertain if they are doing satisfactorily.

CATTLE.—Cows, if not housed, should be rugged. Rugs should be removed and aired in the day-time when the shade temperature reaches 60 degrees. Give a ration of hay or straw, whole or chaffed, to counteract the purging effects of young grass. Cows about to calve, if over-fat, should be put into a paddock in which the feed is not too abundant. If in low condition feed well to tide them over the period and stimulate milk flow. It should be borne in mind that the cows most liable to milk fever are those that have been low in condition and are rapidly thriving. The treatment described in the *Year-Book of Agriculture*, 1905, should be almost invariably successful. It will generally be found most profitable to have cows calve in autumn. They will then pay well for feeding through the winter, and will flush again with the spring grass. Calves should be provided with warm dry shed. Cows and heifers for early autumn calving may be put to the bull. Observe strict cleanliness and regularity with regard to temperature and quantity of feed to avoid losses and sickness incidental to calf rearing.

PIGS.—Supply plenty of bedding in well-ventilated sties. Sows in fine weather should be given grass or lucerne run. Bulletin on the Pig Industry is now available.

SHEEP.—As June is the month in which the bulk of the lambs are dropped in Victoria, careful attention should be given to all flocks of lambing ewes. Two- and four-teeth ewes, particularly merino and fine-woolled crosses lambing to English rams, often have trouble. The flock-owner should visit the paddock at least twice a day during the peak period of lambing, so that aid may be given to any young ewes that are having abnormal difficulty in parturition. It is not wise, of course, to disturb the flock unnecessarily at this stage, and sheep dogs should not be allowed to accompany the flock-master on his daily rounds.

It may be found advisable to induce the young ewe to take to her lamb immediately after birth; to help in this a small enclosure of stone, wood, or brick might be built in a convenient place; the ewe, with her lamb, should be put therein for a few hours; the result will usually prove worth the trouble.

Mark ram lambs as soon as possible; this can be done any time after a week from date of dropping, and should not be left later than one month.

Cut off ewes with oldest lambs, and drive to best pasture available.

Flocks of dry sheep should be attended to regularly, and, if necessary, crutched, the wool removed from around the eyes, hoofs pared, and treatment administered in case of worms, or flies, or foot-rot. Hoofs can be pared easily during the winter months; it should be remembered that overgrown hoofs are conducive to lameness, and even to foot-rot.

Stud sheep intended for exhibition should be given special feed from now on, and their wool looked to for general protection.

Foxes are more ravenous during the winter months. Sparrows, starlings, and parrots are good bait. Poisoning the carcasses of lambs usually accounts for scavenger foxes only. Powdered strychnine just sufficient to cover a three-penny piece is the usual dose to apply to a bait.

POULTRY.—Supplies of shell grit and charcoal should always be available. Sow a mixture of English grass and clover; this not only removes taint in soil but provides excellent green fodder for stock. Where possible, lucerne and silver beet should now be sown for summer feed; liver (cooked) and maize aids to egg production during cold weather. Morning mash should be mixed with liver soup given to the birds warm in a crumbly condition. All yards should be drained to ensure comfort for the birds.

CULTIVATION.

FARM.—Plough potato land. Land to be sown later on with potatoes, mangolds, maize, and millet should be manured and well worked. Sow malting barley and sow cereals. Lift and store mangolds, turnips, &c. Clean out drains and water furrows. Clean up and stack manure in heaps protected from the weather.

ORCHARD.—Finish ploughing; plant young trees; spray with red oil or petroleum for scales, mites, aphis, &c.; carry out drainage system; clean out drains; commence pruning.

VEGETABLE GARDEN.—Prepare beds for crops; cultivate deeply; practise rotation in planting out; renovate asparagus beds; plant out all seedlings; sow radish, peas, broad beans, leeks, spinach, lettuce, carrot, &c.; plant rhubarb.

FLOWER GARDEN.—Continue digging and manuring; dig all weeds and leafy growths; plant out shrubs, roses, &c.; plant rose cuttings; prune deciduous trees and shrubs; sow sweet peas and plant out seedlings.

VINEYARD.—Thoroughly prepare for plantation, land already sub-soiled for the purpose. Remember that the freer it is kept from weeds from this forward, the less trouble will there be from cut-worms next spring. Applications for grafted resistant rootlings and cuttings must be made before the end of the month—see current issue. Pruning and ploughing should be actively proceeded with. In northern districts plough to a depth of seven or eight inches Manures should be applied as early as possible.

Cellar.—Rack all wines which have not been previously dealt with. Fortify sweet wines to full strength.

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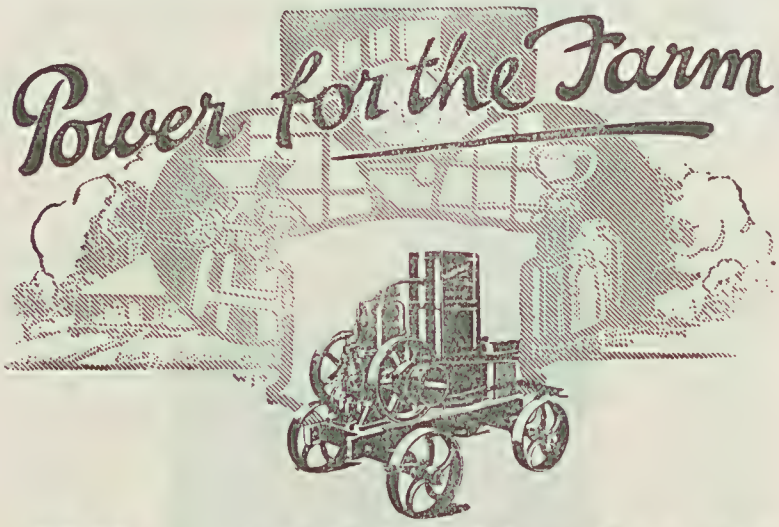

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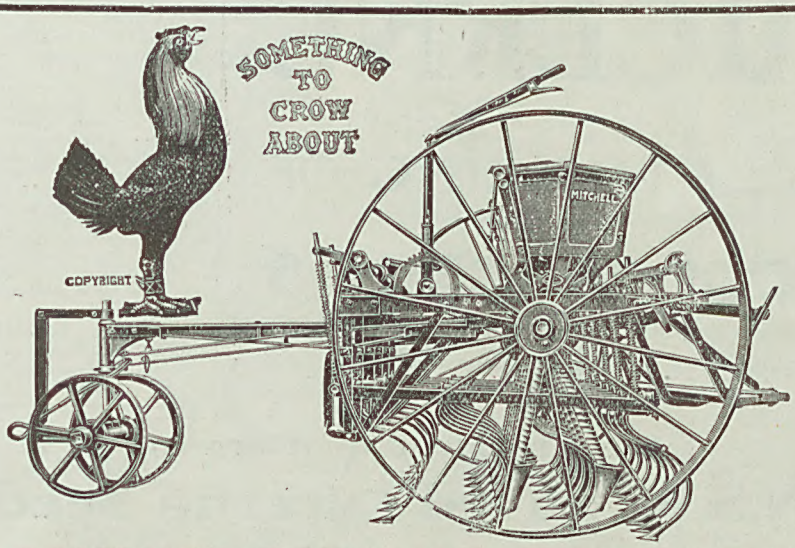

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(For Record of Yields of dams see Red Poll Herd Book.)

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"CLETRAC" has stood the test of time!—proof positive of its lasting qualities and mechanical excellence. But it is in performances that "Cletrac" has such amazing advantages over other tractors.

A Tractor that will replace 8 horses on the farm, work every day in the year, if necessary, and run on kerosene—**at half the cost of horse feed,** is truly an asset to any farmer. These accomplishments are only part of "Cletrac's" wonderful utility:—Pumping Water, Cleaning Tanks, Sawing and Hauling Wood, Grinding Feed and Grain are all jobs that yield to the "Iron Horse that Never Tires."

"Cletrac" lays its own Tracks!

There must always be a basic reason when one line is superior to all others! In "Cletrac's" case its tremendous advantages are largely due to its unique method of running on its own tracks. The principal of the War Tanks' self-laying tracks is embodied in the "Cletrac"—**and perfected!** This method reduces the ground pressure to 4½ lb. per sq. inch, and in a special test it was definitely proved that **"Cletrac" has a lighter ground pressure per sq. inch than a man!** Every farmer will realize what that means at fallowing time.

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